

THE Chemical Age

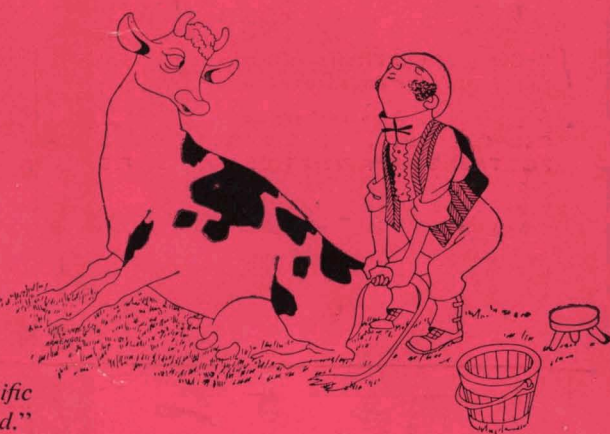
VOL. LXXIII

5 NOVEMBER 1955

No. 1895

Such difficulties arise

"Many difficulties occur in the pursuits of the dairy farmer which render his occupation precarious. Such difficulties arise entirely from an ignorance of the scientific relations of the practice in which he is engaged."



Evidently the scientific approach to dairy farming was already an active force 112 years ago, for the sentences quoted come from a paper 'On the Changes in Composition of the Milk of a Cow according to its Exercise and Food' delivered by Dr. Lyon Playfair in January 1843 and recorded in the first issue of the Journal of the

Chemical Society. Modern dairy physiologists prefer to use a herd, or identical twin cattle, in their feeding tests, rather than the one cow of Dr. Playfair. Dairy analysts also seek greater accuracy in their control methods and find it by using B.D.H. reagents specifically prepared for milk testing purposes:—

STANDARD METHYLENE BLUE TABLETS
RESAZURIN TABLETS
RINGER'S SOLUTION TABLETS
BUFFER SUBSTRATE TABLETS FOR THE PHOSPHATASE TEST
FOLIN & CIOCCATELLI'S REAGENT
SODIUM PHENYL PHOSPHATE
SODIUM *p*-NITROPHENYL PHOSPHATE

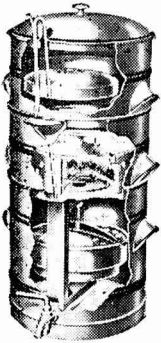
B.D.H.

LABORATORY CHEMICALS

THE BRITISH DRUG HOUSES LTD. B.D.H. LABORATORY CHEMICALS GROUP POOLE DORSET

LC/P/10SL

WELLS OIL FILTERS



With a Wells' waste oil filter you can use your oil several times over and change it more often. A thoroughly reliable supply of oil is assured with the use of Wells' special filter pads which work in conjunction with Wells' patent syphon feed. The oil delivered from a Wells' filter can be used with complete confidence.

Write for fuller particulars of these filters

Delivery of Oil Filters and special "Wells' Filter Pads from Stock"

**Also makers of
OIL CABINETS, BARREL POURERS &
PORTABLE PARAFFIN HEATER PLANTS**

A. C. WELLS & CO. LTD.

11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39, 41, 43, 45, 47, 49, 51, 53, 55, 57, 59, 61, 63, 65, 67, 69, 71, 73, 75, 77, 79, 81, 83, 85, 87, 89, 91, 93, 95, 97, 99, 101, 103, 105, 107, 109, 111, 113, 115, 117, 119, 121, 123, 125, 127, 129, 131, 133, 135, 137, 139, 141, 143, 145, 147, 149, 151, 153, 155, 157, 159, 161, 163, 165, 167, 169, 171, 173, 175, 177, 179, 181, 183, 185, 187, 189, 191, 193, 195, 197, 199, 201, 203, 205, 207, 209, 211, 213, 215, 217, 219, 221, 223, 225, 227, 229, 231, 233, 235, 237, 239, 241, 243, 245, 247, 249, 251, 253, 255, 257, 259, 261, 263, 265, 267, 269, 271, 273, 275, 277, 279, 281, 283, 285, 287, 289, 291, 293, 295, 297, 299, 301, 303, 305, 307, 309, 311, 313, 315, 317, 319, 321, 323, 325, 327, 329, 331, 333, 335, 337, 339, 341, 343, 345, 347, 349, 351, 353, 355, 357, 359, 361, 363, 365, 367, 369, 371, 373, 375, 377, 379, 381, 383, 385, 387, 389, 391, 393, 395, 397, 399, 401, 403, 405, 407, 409, 411, 413, 415, 417, 419, 421, 423, 425, 427, 429, 431, 433, 435, 437, 439, 441, 443, 445, 447, 449, 451, 453, 455, 457, 459, 461, 463, 465, 467, 469, 471, 473, 475, 477, 479, 481, 483, 485, 487, 489, 491, 493, 495, 497, 499, 501, 503, 505, 507, 509, 511, 513, 515, 517, 519, 521, 523, 525, 527, 529, 531, 533, 535, 537, 539, 541, 543, 545, 547, 549, 551, 553, 555, 557, 559, 561, 563, 565, 567, 569, 571, 573, 575, 577, 579, 581, 583, 585, 587, 589, 591, 593, 595, 597, 599, 601, 603, 605, 607, 609, 611, 613, 615, 617, 619, 621, 623, 625, 627, 629, 631, 633, 635, 637, 639, 641, 643, 645, 647, 649, 651, 653, 655, 657, 659, 661, 663, 665, 667, 669, 671, 673, 675, 677, 679, 681, 683, 685, 687, 689, 691, 693, 695, 697, 699, 701, 703, 705, 707, 709, 711, 713, 715, 717, 719, 721, 723, 725, 727, 729, 731, 733, 735, 737, 739, 741, 743, 745, 747, 749, 751, 753, 755, 757, 759, 761, 763, 765, 767, 769, 771, 773, 775, 777, 779, 781, 783, 785, 787, 789, 791, 793, 795, 797, 799, 801, 803, 805, 807, 809, 811, 813, 815, 817, 819, 821, 823, 825, 827, 829, 831, 833, 835, 837, 839, 841, 843, 845, 847, 849, 851, 853, 855, 857, 859, 861, 863, 865, 867, 869, 871, 873, 875, 877, 879, 881, 883, 885, 887, 889, 891, 893, 895, 897, 899, 901, 903, 905, 907, 909, 911, 913, 915, 917, 919, 921, 923, 925, 927, 929, 931, 933, 935, 937, 939, 941, 943, 945, 947, 949, 951, 953, 955, 957, 959, 961, 963, 965, 967, 969, 971, 973, 975, 977, 979, 981, 983, 985, 987, 989, 991, 993, 995, 997, 999, 1001, 1003, 1005, 1007, 1009, 1011, 1013, 1015, 1017, 1019, 1021, 1023, 1025, 1027, 1029, 1031, 1033, 1035, 1037, 1039, 1041, 1043, 1045, 1047, 1049, 1051, 1053, 1055, 1057, 1059, 1061, 1063, 1065, 1067, 1069, 1071, 1073, 1075, 1077, 1079, 1081, 1083, 1085, 1087, 1089, 1091, 1093, 1095, 1097, 1099, 1101, 1103, 1105, 1107, 1109, 1111, 1113, 1115, 1117, 1119, 1121, 1123, 1125, 1127, 1129, 1131, 1133, 1135, 1137, 1139, 1141, 1143, 1145, 1147, 1149, 1151, 1153, 1155, 1157, 1159, 1161, 1163, 1165, 1167, 1169, 1171, 1173, 1175, 1177, 1179, 1181, 1183, 1185, 1187, 1189, 1191, 1193, 1195, 1197, 1199, 1201, 1203, 1205, 1207, 1209, 1211, 1213, 1215, 1217, 1219, 1221, 1223, 1225, 1227, 1229, 1231, 1233, 1235, 1237, 1239, 1241, 1243, 1245, 1247, 1249, 1251, 1253, 1255, 1257, 1259, 1261, 1263, 1265, 1267, 1269, 1271, 1273, 1275, 1277, 1279, 1281, 1283, 1285, 1287, 1289, 1291, 1293, 1295, 1297, 1299, 1301, 1303, 1305, 1307, 1309, 1311, 1313, 1315, 1317, 1319, 1321, 1323, 1325, 1327, 1329, 1331, 1333, 1335, 1337, 1339, 1341, 1343, 1345, 1347, 1349, 1351, 1353, 1355, 1357, 1359, 1361, 1363, 1365, 1367, 1369, 1371, 1373, 1375, 1377, 1379, 1381, 1383, 1385, 1387, 1389, 1391, 1393, 1395, 1397, 1399, 1401, 1403, 1405, 1407, 1409, 1411, 1413, 1415, 1417, 1419, 1421, 1423, 1425, 1427, 1429, 1431, 1433, 1435, 1437, 1439, 1441, 1443, 1445, 1447, 1449, 1451, 1453, 1455, 1457, 1459, 1461, 1463, 1465, 1467, 1469, 1471, 1473, 1475, 1477, 1479, 1481, 1483, 1485, 1487, 1489, 1491, 1493, 1495, 1497, 1499, 1501, 1503, 1505, 1507, 1509, 1511, 1513, 1515, 1517, 1519, 1521, 1523, 1525, 1527, 1529, 1531, 1533, 1535, 1537, 1539, 1541, 1543, 1545, 1547, 1549, 1551, 1553, 1555, 1557, 1559, 1561, 1563, 1565, 1567, 1569, 1571, 1573, 1575, 1577, 1579, 1581, 1583, 1585, 1587, 1589, 1591, 1593, 1595, 1597, 1599, 1601, 1603, 1605, 1607, 1609, 1611, 1613, 1615, 1617, 1619, 1621, 1623, 1625, 1627, 1629, 1631, 1633, 1635, 1637, 1639, 1641, 1643, 1645, 1647, 1649, 1651, 1653, 1655, 1657, 1659, 1661, 1663, 1665, 1667, 1669, 1671, 1673, 1675, 1677, 1679, 1681, 1683, 1685, 1687, 1689, 1691, 1693, 1695, 1697, 1699, 1701, 1703, 1705, 1707, 1709, 1711, 1713, 1715, 1717, 1719, 1721, 1723, 1725, 1727, 1729, 1731, 1733, 1735, 1737, 1739, 1741, 1743, 1745, 1747, 1749, 1751, 1753, 1755, 1757, 1759, 1761, 1763, 1765, 1767, 1769, 1771, 1773, 1775, 1777, 1779, 1781, 1783, 1785, 1787, 1789, 1791, 1793, 1795, 1797, 1799, 1801, 1803, 1805, 1807, 1809, 1811, 1813, 1815, 1817, 1819, 1821, 1823, 1825, 1827, 1829, 1831, 1833, 1835, 1837, 1839, 1841, 1843, 1845, 1847, 1849, 1851, 1853, 1855, 1857, 1859, 1861, 1863, 1865, 1867, 1869, 1871, 1873, 1875, 1877, 1879, 1881, 1883, 1885, 1887, 1889, 1891, 1893, 1895, 1897, 1899, 1901, 1903, 1905, 1907, 1909, 1911, 1913, 1915, 1917, 1919, 1921, 1923, 1925, 1927, 1929, 1931, 1933, 1935, 1937, 1939, 1941, 1943, 1945, 1947, 1949, 1951, 1953, 1955, 1957, 1959, 1961, 1963, 1965, 1967, 1969, 1971, 1973, 1975, 1977, 1979, 1981, 1983, 1985, 1987, 1989, 1991, 1993, 1995, 1997, 1999, 2001, 2003, 2005, 2007, 2009, 2011, 2013, 2015, 2017, 2019, 2021, 2023, 2025, 2027, 2029, 2031, 2033, 2035, 2037, 2039, 2041, 2043, 2045, 2047, 2049, 2051, 2053, 2055, 2057, 2059, 2061, 2063, 2065, 2067, 2069, 2071, 2073, 2075, 2077, 2079, 2081, 2083, 2085, 2087, 2089, 2091, 2093, 2095, 2097, 2099, 2101, 2103, 2105, 2107, 2109, 2111, 2113, 2115, 2117, 2119, 2121, 2123, 2125, 2127, 2129, 2131, 2133, 2135, 2137, 2139, 2141, 2143, 2145, 2147, 2149, 2151, 2153, 2155, 2157, 2159, 2161, 2163, 2165, 2167, 2169, 2171, 2173, 2175, 2177, 2179, 2181, 2183, 2185, 2187, 2189, 2191, 2193, 2195, 2197, 2199, 2201, 2203, 2205, 2207, 2209, 2211, 2213, 2215, 2217, 2219, 2221, 2223, 2225, 2227, 2229, 2231, 2233, 2235, 2237, 2239, 2241, 2243, 2245, 2247, 2249, 2251, 2253, 2255, 2257, 2259, 2261, 2263, 2265, 2267, 2269, 2271, 2273, 2275, 2277, 2279, 2281, 2283, 2285, 2287, 2289, 2291, 2293, 2295, 2297, 2299, 2301, 2303, 2305, 2307, 2309, 2311, 2313, 2315, 2317, 2319, 2321, 2323, 2325, 2327, 2329, 2331, 2333, 2335, 2337, 2339, 2341, 2343, 2345, 2347, 2349, 2351, 2353, 2355, 2357, 2359, 2361, 2363, 2365, 2367, 2369, 2371, 2373, 2375, 2377, 2379, 2381, 2383, 2385, 2387, 2389, 2391, 2393, 2395, 2397, 2399, 2401, 2403, 2405, 2407, 2409, 2411, 2413, 2415, 2417, 2419, 2421, 2423, 2425, 2427, 2429, 2431, 2433, 2435, 2437, 2439, 2441, 2443, 2445, 2447, 2449, 2451, 2453, 2455, 2457, 2459, 2461, 2463, 2465, 2467, 2469, 2471, 2473, 2475, 2477, 2479, 2481, 2483, 2485, 2487, 2489, 2491, 2493, 2495, 2497, 2499, 2501, 2503, 2505, 2507, 2509, 2511, 2513, 2515, 2517, 2519, 2521, 2523, 2525, 2527, 2529, 2531, 2533, 2535, 2537, 2539, 2541, 2543, 2545, 2547, 2549, 2551, 2553, 2555, 2557, 2559, 2561, 2563, 2565, 2567, 2569, 2571, 2573, 2575, 2577, 2579, 2581, 2583, 2585, 2587, 2589, 2591, 2593, 2595, 2597, 2599, 2601, 2603, 2605, 2607, 2609, 2611, 2613, 2615, 2617, 2619, 2621, 2623, 2625, 2627, 2629, 2631, 2633, 2635, 2637, 2639, 2641, 2643, 2645, 2647, 2649, 2651, 2653, 2655, 2657, 2659, 2661, 2663, 2665, 2667, 2669, 2671, 2673, 2675, 2677, 2679, 2681, 2683, 2685, 2687, 2689, 2691, 2693, 2695, 2697, 2699, 2701, 2703, 2705, 2707, 2709, 2711, 2713, 2715, 2717, 2719, 2721, 2723, 2725, 2727, 2729, 2731, 2733, 2735, 2737, 2739, 2741, 2743, 2745, 2747, 2749, 2751, 2753, 2755, 2757, 2759, 2761, 2763, 2765, 2767, 2769, 2771, 2773, 2775, 2777, 2779, 2781, 2783, 2785, 2787, 2789, 2791, 2793, 2795, 2797, 2799, 2801, 2803, 2805, 2807, 2809, 2811, 2813, 2815, 2817, 2819, 2821, 2823, 2825, 2827, 2829, 2831, 2833, 2835, 2837, 2839, 2841, 2843, 2845, 2847, 2849, 2851, 2853, 2855, 2857, 2859, 2861, 2863, 2865, 2867, 2869, 2871, 2873, 2875, 2877, 2879, 2881, 2883, 2885, 2887, 2889, 2891, 2893, 2895, 2897, 2899, 2901, 2903, 2905, 2907, 2909, 2911, 2913, 2915, 2917, 2919, 2921, 2923, 2925, 2927, 2929, 2931, 2933, 2935, 2937, 2939, 2941, 2943, 2945, 2947, 2949, 2951, 2953, 2955, 2957, 2959, 2961, 2963, 2965, 2967, 2969, 2971, 2973, 2975, 2977, 2979, 2981, 2983, 2985, 2987, 2989, 2991, 2993, 2995, 2997, 2999, 3001, 3003, 3005, 3007, 3009, 3011, 3013, 3015, 3017, 3019, 3021, 3023, 3025, 3027, 3029, 3031, 3033, 3035, 3037, 3039, 3041, 3043, 3045, 3047, 3049, 3051, 3053, 3055, 3057, 3059, 3061, 3063, 3065, 3067, 3069, 3071, 3073, 3075, 3077, 3079, 3081, 3083, 3085, 3087, 3089, 3091, 3093, 3095, 3097, 3099, 3101, 3103, 3105, 3107, 3109, 3111, 3113, 3115, 3117, 3119, 3121, 3123, 3125, 3127, 3129, 3131, 3133, 3135, 3137, 3139, 3141, 3143, 3145, 3147, 3149, 3151, 3153, 3155, 3157, 3159, 3161, 3163, 3165, 3167, 3169, 3171, 3173, 3175, 3177, 3179, 3181, 3183, 3185, 3187, 3189, 3191, 3193, 3195, 3197, 3199, 3201, 3203, 3205, 3207, 3209, 3211, 3213, 3215, 3217, 3219, 3221, 3223, 3225, 3227, 3229, 3231, 3233, 3235, 3237, 3239, 3241, 3243, 3245, 3247, 3249, 3251, 3253, 3255, 3257, 3259, 3261, 3263, 3265, 3267, 3269, 3271, 3273, 3275, 3277, 3279, 3281, 3283, 3285, 3287, 3289, 3291, 3293, 3295, 3297, 3299, 3301, 3303, 3305, 3307, 3309, 3311, 3313, 3315, 3317, 3319, 3321, 3323, 3325, 3327, 3329, 3331, 3333, 3335, 3337, 3339, 3341, 3343, 3345, 3347, 3349, 3351, 3353, 3355, 3357, 3359, 3361, 3363, 3365, 3367, 3369, 3371, 3373, 3375, 3377, 3379, 3381, 3383, 3385, 3387, 3389, 3391, 3393, 3395, 3397, 3399, 3401, 3403, 3405, 3407, 3409, 3411, 3413, 3415, 3417, 3419, 3421, 3423, 3425, 3427, 3429, 3431, 3433, 3435, 3437, 3439, 3441, 3443, 3445, 3447, 3449, 3451, 3453, 3455, 3457, 3459, 3461, 3463, 3465, 3467, 3469, 3471, 3473, 3475, 3477, 3479, 3481, 3483, 3485, 3487, 3489, 3491, 3493, 3495, 3497, 3499, 3501, 3503, 3505, 3507, 3509, 3511, 3513, 3515, 3517, 3519, 3521, 3523, 3525, 3527, 3529, 3531, 3533, 3535, 3537, 3539, 3541, 3543, 3545, 3547, 3549, 3551, 3553, 3555, 3557, 3559, 3561, 3563, 3565, 3567, 3569, 3571, 3573, 3575, 3577, 3579, 3581, 3583, 3585, 3587, 3589, 3591, 3593, 3595, 3597, 3599, 3601, 3603, 3605, 3607, 3609, 3611, 3613, 3615, 3617, 3619, 3621, 3623, 3625, 3627, 3629, 3631, 3633, 3635, 3637, 3639, 3641, 3643, 3645, 3647, 3649, 3651, 3653, 3655, 3657, 3659, 3661, 3663, 3665, 3667, 3669, 3671, 3673, 3675, 3677, 3679, 3681, 3683, 3685, 3687, 3689, 3691, 3693, 3695, 3697, 3699, 3701, 3703, 3705, 3707, 3709, 3711, 3713, 3715, 3717, 3719, 3721, 3723, 3725, 3727, 3729, 3731, 3733, 3735, 3737, 3739, 3741, 3743, 3745, 3747, 3749, 3751, 3753, 3755, 3757, 3759, 3761, 3763, 3765, 3767, 3769, 3771, 3773, 3775, 3777, 3779, 3781, 3783, 3785, 3787, 3789, 3791, 3793, 3795, 3797, 3799, 3801, 3803, 3805, 3807, 3809, 3811, 3813, 3815, 3817, 3819, 3821, 3823, 3825, 3827, 3829, 3831, 3833, 3835, 3837, 3839, 3841, 3843, 3845, 3847, 3849, 3851, 3853, 3855, 3857, 3859, 3861, 3863, 3865, 3867, 3869, 3871, 3873, 3875, 3877, 3879, 3881, 3883, 3885, 3887, 3889, 3891, 3893, 3895, 3897, 3899, 3901, 3903, 3905, 3907, 3909, 3911, 3913, 3915, 3917, 3919, 3921, 3923, 3925, 3927, 3929, 3931, 3933, 3935, 3937, 3939, 3941, 3943, 3945, 3947, 3949, 3951, 3953, 3955, 3957, 3959, 3961, 3963, 3965, 3967, 3969, 3971, 3973, 3975, 3977, 3979, 3981, 3983, 3985, 3987, 3989, 3991, 3993, 3995, 3997, 3999, 4001, 4003, 4005, 4007, 4009, 4011, 4013, 4015, 4017, 4019, 4021, 4023, 4025, 4027, 4029, 4031, 4033, 4035, 4037, 4039, 4041, 4043, 4045, 4047, 4049, 4051, 4053, 4055, 4057, 4059, 4061, 4063, 4065, 4067, 4069, 4071, 4073, 4075, 4077, 4079, 4081, 4083, 4085, 4087, 4089, 4091, 4093, 4095, 4097, 4099, 4101, 4103, 4105, 4107, 4109, 4111, 4113, 4115, 4117, 4119, 4121, 4123, 4125, 4127, 4129, 4131, 4133, 4135, 413



PUT AWAY THAT COIN!

That's no way to plan a lighting installation!

Nothing must be left to chance . . . type of fitting,
spacing, mounting . . . quality of distribution . . .
total wattage, and individual lighting points.

We'd like to show you the way *we* go about a job.

We'd like to show you some lighting specifications
we have prepared. Please call us in and talk it over.

BENJAMIN

ILLUMINATING

ENGINEERING

SERVICE

*better
lighting
by*



BENJAMIN
REGD.

THE BENJAMIN ELECTRIC LTD. TOTTENHAM * LONDON N. 17
Telephone: TOTTENHAM 5252 (5 lines) Cables: 'Benjalect, Southcot, London'

BIRMINGHAM: 5 CORPORATION STREET, BIRMINGHAM, 2. Tel: MIDland 5197 • LEEDS: 49 BASINGHALL STREET, LEEDS, 1. Tel: LEeds 45379

Small's 33

TRAINING SCHEMES for BOILER OPERATORS

If you have not enrolled your Boiler Operators for a Technical College Course there is still time to enrol for N.I.F.E.S own Course.

Specially devised for those unable to attend at a Technical College, N.I.F.E.S Course provides home study supplemented by practical training on site in preparation for the City and Guilds Boiler Operator's Certificate. The Course costs £5. 5s. 0d. plus examination fee of 25s. per student.

Details are available from Head Office or any Area Office of N.I.F.E.S.

Issued by

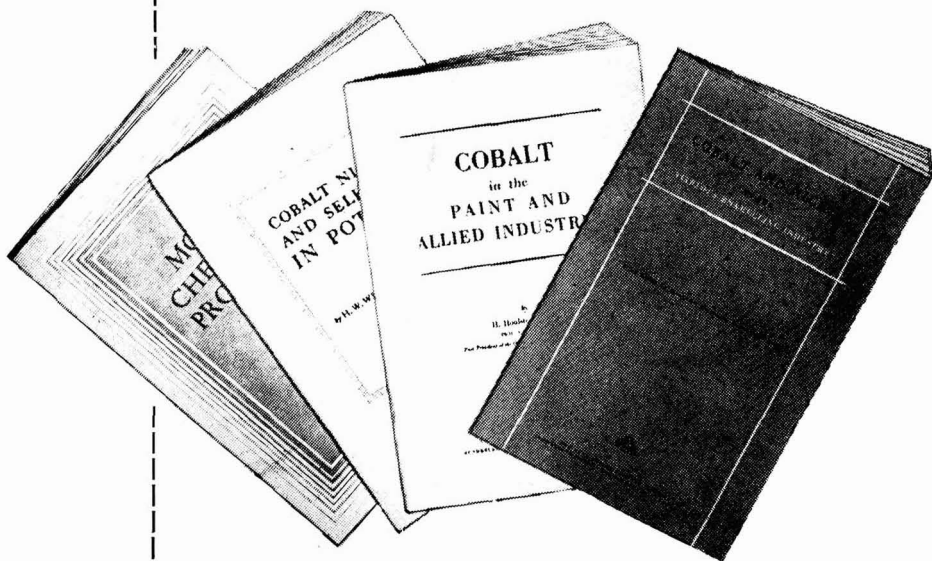
N · I · F · E · S

National Industrial Fuel Efficiency Service

71 Grosvenor Street London W1

Telephone : Hyde Park 9706

MOND Chemical Products



Nickel and Cobalt Oxides and Salts Selenium Tellurium

We issue the following publications on uses of Mond Chemical Products :

Cobalt and Nickel in the Vitreous Enamelling Industry. By J. E. Hansen, B.Sc., F.Am.Cer. Soc.

Cobalt, Nickel and Selenium in Pottery. By H.E. Webb, O.B.E., D.Sc., F.R.I.C., M.I.Chem.E.

Cobalt in the Paint and Allied Industries. By H. Houlston Morgan, Ph.D., A.R.C.S., F.R.I.C.

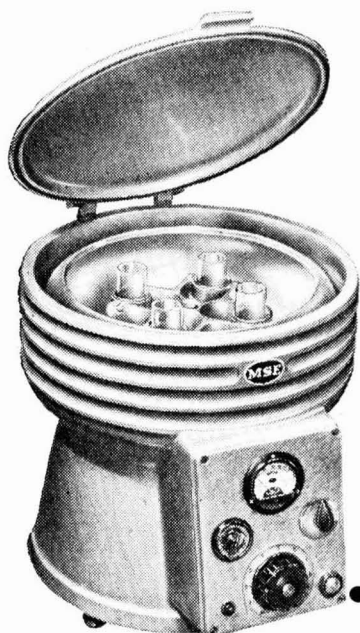
Mond Chemical Products. A list of products we regularly supply.

Copies of any of the above publications will be sent free on request.

THE MOND NICKEL COMPANY LIMITED

Thames House · Millbank · London · S.W.1



**NEW****The MSE "MULTEX" CENTRIFUGE**

This new Centrifuge gives the same centrifugal force of over $3,000 \times g$ at 4,000 r.p.m. with either swing-out or angle type head.

MAXIMUM CAPACITIES

Universal Swing-out Head	Universal Angle Head
4 x 100 ml.	8 x 100 ml.
8 x 50 ml.	8 x 50 ml.
32 x 15 ml.	16 x 15 ml.

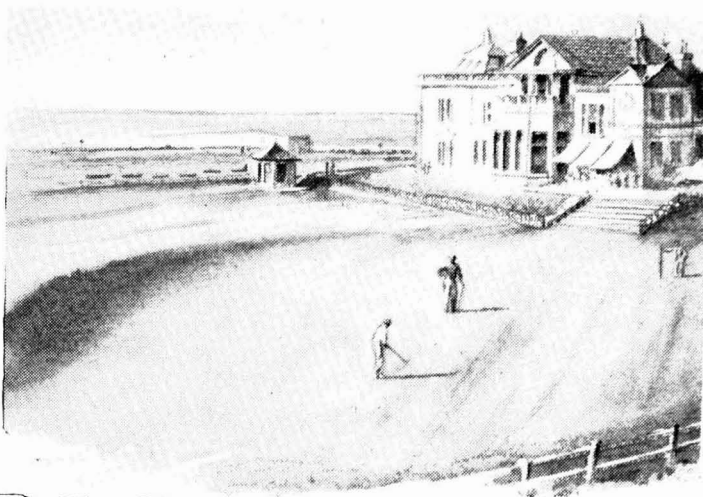
Ask for MSE Publication No. 200

MSE

MEASURING & SCIENTIFIC EQUIPMENT LTD
Spenser Street, London, S.W.1 · VICTORIA 5426

*Famous
Links*

Staveley Chemicals are the
"Links" between raw
materials and finished pro-
ducts in industry.

**STAVELEY**

The Old Course
at St. Andrews.
A view of the
18th hole.

BASIC CHEMICALS FOR INDUSTRY

THE STAVELEY IRON & CHEMICAL CO. LTD.

NR. CHESTERFIELD

● TEXTILE CHEMICALS

LAURYL PYRIDINIUM CHLORIDE
CETYL PYRIDINIUM CHLORIDE
 Quaternary Ammonium Compounds of high surface activity.

● PHARMACEUTICAL CHEMICALS

BENZALKONIUM CHLORIDE
(Distributed by Bayer Products Ltd.)
CETYL DIMETHYL BENZYL AMMONIUM CHLORIDE
CETYL TRIMETHYL AMMONIUM CHLORIDE
CETYL PYRIDINIUM CHLORIDE
 Quaternary Ammonium Compounds of high purity with outstanding Germicidal properties.

● COSMETIC CHEMICALS

STEBAC An outstanding base for the hairdressing industry incorporating Stearyl Dimethyl Benzyl Ammonium Chloride. The corresponding Cetyl compound is also available.

● RUBBER CHEMICALS

ZINC DIETHYL DITHIOCARBAMATE
ZINC DIMETHYL DITHIOCARBAMATE
TETRAMETHYL THIURAM DISULPHIDE
TETRAETHYL THIURAM DISULPHIDE
 Accelerators used in Foam rubber processing.

● ANTISTATIC CHEMICALS

HEATEX A long chain Quaternary incorporating outstanding anti-static properties to plastics, synthetic fibres, etc.
ANTIMIDE A fatty Ethanolamid with Quaternary groups particularly useful for discharging static when processing Nylon.

INDUSTRIAL CHEMICALS

N. MONO-ETHYL ANILINE
NN. DIETHYL ANILINE

We shall also shortly be introducing experimental quantities of the ring substituted Primary, Secondary and Tertiary Ethyl Anilines.

DYESTUFFS INTERMEDIATES

● ALKYL CHLORIDES

STEARYL CHLORIDE · CETYL CHLORIDE
MYRISTYL CHLORIDE · LAURYL CHLORIDE
BUTYL CHLORIDE

Intermediates for the manufacture of Amines, Quaternary Ammonium Compounds and Grignard compounds.

CHLORO-METHYL METHYL ETHER A useful Chloro-Methylating agent and an intermediate in the manufacture of ion exchange resins.

para CHLORO-METHYL TOLUENE
 At present in small scale production. A potential

route to Terephthalic Acid.

ANHYDROUS HYDROCHLORIC ACID GAS

Solutions in various alcohols and ethers. Extremely useful materials for Esterifications and reactions involving the use of Anhydrous HCL and for the preparation of Anhydrous Amine Salts.

CHLORINATED COMPOUNDS



LEDA
CHEMICALS LTD

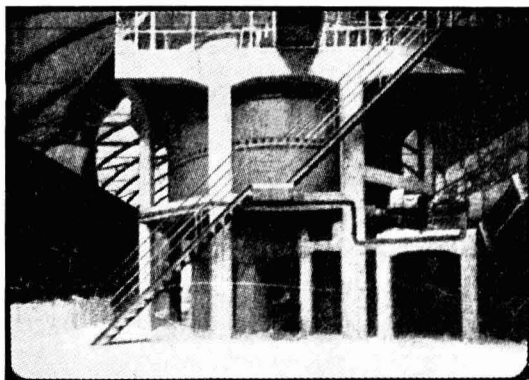
ELEY ESTATE, ANGEL ROAD, EDMONTON, LONDON N18

Cables & Telegrams **LEDAKEM LONDON**

Telephone **EDMONTON 6322/3/4**

CONTINUOUS SUPERPHOSPHATE DEN

FROM 3 TO 40 TONS PER HOUR



CONTINUOUS DEN: Output 25 tons/hour

Phone: FROBISHER 0769

Grams: MORICHEMIC, LONDON

SULPHURIC ACID PLANTS

PYRITES & SULPHUR
BURNERS

DUST PRECIPITATORS

GRINDING MILLS

SUNDRY CHEMICAL PLANTS

MORITZ
CHEMICAL ENGINEERING CO. LTD
204, Earls Court Road London, S.W.5

HAVE YOU A WORKS FIRE BRIGADE ?

Fire Loss in the United Kingdom runs to some £25,000,000 per annum, the bulk of which occurs in industrial concerns.

FIRE PROTECTION REVIEW, recognised as the Technical Newspaper of the Industrial Fire services, carries month by month, many features and articles of special value to executives in any way connected with industrial Fire protection and extinction and safety measures.



Fill in the form for a free specimen copy and subscription details to :

FIRE PROTECTION REVIEW

BENN BROTHERS, LIMITED,
Bouverie House, Fleet Street,
London, E.C.4, England



Please send, without obligation on our part, a specimen copy of FIRE PROTECTION REVIEW and details of subscription :—

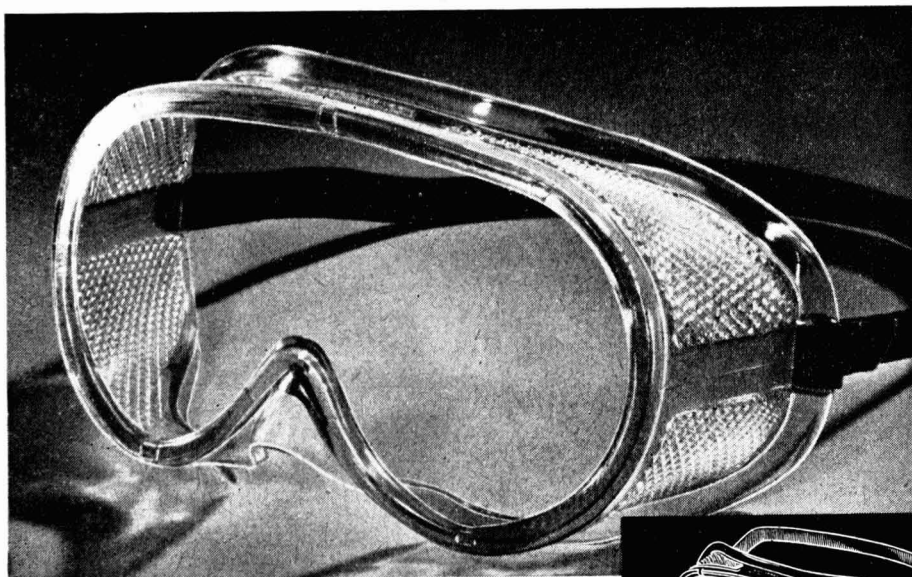
For attention of.....

Name of Firm.....

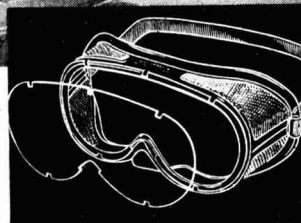
Address

Date.....

PANORAMA spells safety



PANORAMETTE the world's
finest two-piece*, all-purpose goggle



Scientifically designed—and comprising a tough but flexible PVC frame and a thick acetate window, optically correct, of extremely high impact strength. Equally suitable for men and women, the Panoramette enables all workers to operate in absolute safety and comfort and with unimpaired vision.

A light-weight, beautifully balanced goggle which conforms to the contours of the face and easily accommodates all types of spectacles.

Adequately ventilated—yet oil, chemical and water resistant—the Panoramette has excellent insulation and non-irritant properties.

*Window easily removable—with no studs or clips to interfere with wide-angle vision. Replacement windows (a big economy) always available. Frames (according to preference) in crystal-clear, ivory or dark green; windows in crystal clear or green anti-glare tints.

The Panorama model illustrated is only one of a range that meets every industrial requirement in the field of eye and face protection. Full details will gladly be sent on request.

Remember . . . PANORAMA SPELLS SAFETY.

Panorama Equipment Limited

Panorama House, 29/36, Seymour Mews, Wigmore St., London, W.1.
WELbeck 2871

INDUSTRIAL SAFETY • Fire and Accident Prevention and Protection

The leading Industrial
Undertakings and
Municipal Authorities
specify

WALLACH BROS. LTD.

**49, TABERNACLE STREET,
LONDON, E.C.2**



Specialists for nearly Seventy Years

OURS ALONE ?

**YES, FACE IT:
FOR 5 MINUTES !**

We must fight the Fire Fiend ALONE
before the Fire Brigade gets here.
Please send details of NU-SWIFT
rapid and reliable Fire Extinguishers—
BEFORE IT IS TOO LATE !

Name.....

Address.....

Post NOW to Nu-Swift Ltd. 25 Piccadilly W.1.

In Every Ship of the Royal Navy

For Classified Advertising THE CHEMICAL AGE

Gives direct and immediate penetration. Is the
recognised liaison between buyer and seller.
Accepts advertisements up to first post on
Tuesday for insertion in that week's issue.
Gives a reduced rate for more than three
insertions and

PULLS IN RESULTS

SAFETY FIRST

THE "OLDBURY" PATENT
CARBOY DISCHARGER
will empty and elevate up to 50 feet
the contents of any carboy, bottle or
vessel, and complies with all the con-
ditions of the Factory Act of 1937.

KESTNER'S

8, Grosvenor Gardens, Westminster, London, S.W.

The Jefco

FACE SCREEN

Reg. Design 751914
Patent applied for

Perfect protection
when grinding or
machining. Com-
fortable to wear,
stands clear of the
face, adjustable to
any angle, non-inflam. celluloid easily renewable.



J. & E. FERRIS LTD 33 Museum St., London, W.C

• NEPRO •

LIQUID NEOPRENE PROTECTIVE COATINGS

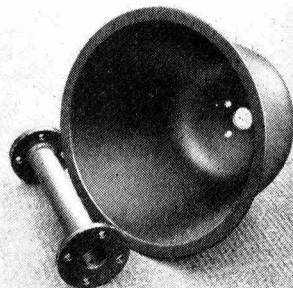
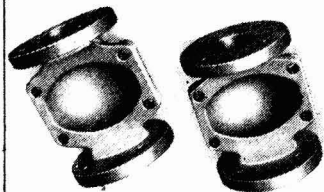
N.200

HEAVY DUTY COATING APPLIED AT OUR WORKS, FOR VALVES,
PIPES, TANKS, CHEMICAL AND MARINE PLANT, ETC.

anti-corrosive

anti-abrasive

MANUFACTURED BY



EAGLE WORKS • WEDNESBURY

TEL • WED 0284 (5 LINES)

weatherproof

N.700

high-adhesion

MAINTENANCE GRADE SUPPLIED READY FOR USE, FOR PROTECTION
FROM FUME & SPLASH OF STEEL WORK AND MARINE PLANT, ETC.

We are the sole licensees in U.K. for Gates Engineering Co., U.S.A. Gaco Processes



INDUSTRIAL GLOVES OVERALLS and PROTECTIVE CLOTHING



Safety depends on the best—that is why so many leading industrial concerns repeatedly specify GUARD Protective Wear. We are actual manufacturers.

Please write for illustrated catalogue.

AIRGUARD LTD.
103, KING ST., LONDON, W.6
Tel : RIV 3642-3-4-5

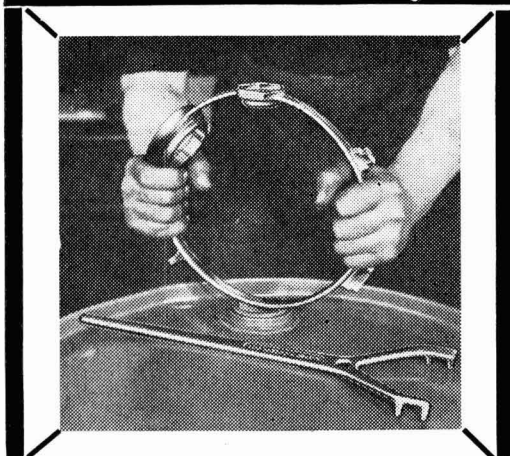
and at Birmingham, Glasgow,
Cardiff, Belfast, Dublin.
Factory—Rowden Works,
Beckenham, Kent.



MULTI-BUNG KEY

PATENT PENDING 21364 54

Non-Sparking



MEIGH CASTINGS LTD.
UCKINGTON FOUNDRY, CHELTENHAM
TELEPHONE 54154



with
TELCON
BERYLLIUM COPPER
TOOLS

Beryllium Copper Safety Tools, by reason of their comparatively high thermal conductivity, have little tendency to spark and can be employed with confidence in dangerous atmospheres. The great strength and hardness of these tools gives them a performance and length of life assuring their superiority in this field, and their best recommendation is their widespread use by major industrial concerns handling inflammable materials.

Distributors for Great Britain

BERYLLIUM & COPPER ALLOYS LTD

47, VICTORIA STREET, LONDON, S.W.1

ABBeY 6259

Manufactured by

TELEGRAPH CONSTRUCTION & MAINTENANCE

TELCON WORKS

GREENWICH • LONDON • S.E.10

NORTHERN OFFICE :

SUSSEX WORKS,
SUSSEX STREET,
SHEFFIELD, 4.

TEL. : SHEFFIELD 20701

MIDLAND OFFICE :

171, GRAVELLY HILL,
ERDINGTON,
BIRMINGHAM, 23

TEL. : ERDINGTON 1749

SCOTTISH OFFICE :

25, EGLINTON STREET
GLASGOW, C.5.

TEL. SOUTH 2815

Volume LXXIII

Number 1895

Established 1919

The Chemical Age

The Weekly Journal of Chemical Engineering and Industrial Chemistry

BOUVERIE HOUSE · 154 FLEET STREET · LONDON EC4

Telephone : FLEET STREET 3212 (26 lines) Telegrams : ALLANGAS · FLEET · LONDON

CONTENTS . 5 NOVEMBER 1955

I.C.I. Titanium Plant	994
Alkali Inspector's Report	995
Annual Report of BSI	997
Demand for Separators	998
'Enforced Order' Crusher & Mixer	999
Food Additives	1002
Indian Newsletter	1003
Hydrogen Production	1004
Development by Pametrada	1005
The Problem of Safety	1006
Safe Practice With Solvents	1008
Safety Notebook	1010
The Chemist's Bookshelf	1013
Home News Items	1015
Overseas News Items	1016
Personal	1017
Publications & Announcements	1019
Law & Company News	1021
Next Week's Events	1022
Market Reports	1024

Editor : E. Arnold Running

Publisher & Manager : A. Walsby

Director : N. B. Livingstone Wallace

MIDLANDS OFFICE :

Daimler House, Paradise
Street, Birmingham

Phone : Midland 0784/5

SCOTTISH OFFICE :

116, Hope Street,
Glasgow, C.2

Phone : Central 3954/5

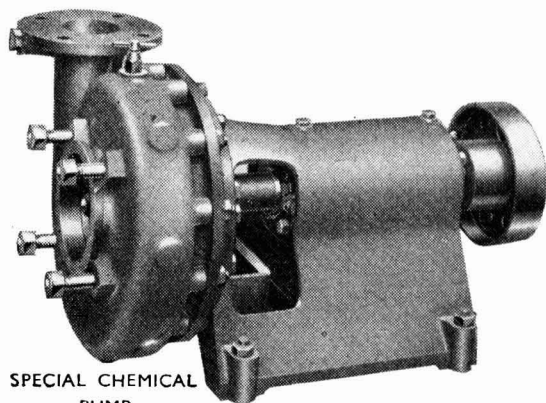
LEEDS OFFICE :

Martins Bank Chambers,
Park Row, Leeds, 1

Phone : Leeds 22601

SINGLE COPY 1/- (BY POST 1/3)

ANNUAL SUBSCRIPTION 42/-



SPECIAL CHEMICAL
PUMP

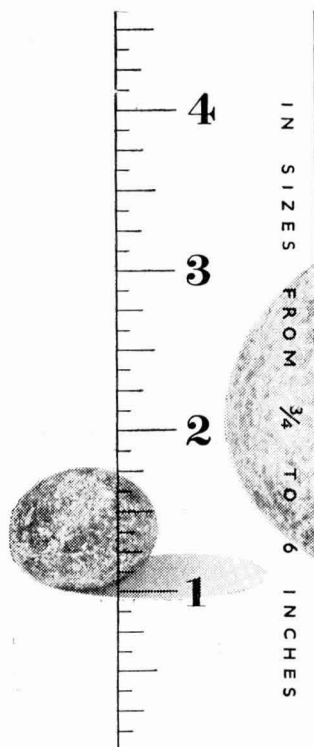
PUMPS

For Food
Chemical Industries
& Processes

A wide range of types, made in corrosive resisting metals and chemical stoneware, to suit the nature of the fluid to be handled.

We will gladly advise intending buyers on the best materials to use

Pulsometer Engineering Co. Ltd.,
11, Elm Ironworks, Reading, England.



ENGLISH & FRENCH FLINT PEBBLES

IT IS A MATTER OF OPINION whether you should use English or French pebbles, but whichever is your choice we can supply you with hand-picked individually selected pebbles ranging from $\frac{1}{4}$ " to 6" in size.

They can be sent to any part of the world.

For over a century we have been noted for prompt deliveries and consistent quality and we value new enquiries.

A.L. WALLEY

FLINT WORKS,
WEST THURROCK, GRAYS, ESSEX.
Associated with ProSilex S.A. Le Treport, France.

Mr. Butler's Second Bite

CRITICISM that Mr. Butler has been forced to produce a second Budget in 1955 must be somewhat out of place in these pages. Some two months ago (*THE CHEMICAL AGE*, 1955, 73, 419-420) we pointed out that 'a second 1955 Budget is preferable to a drift towards crisis. . . .' An over-active, over-prosperous internal economy cannot be safely poised upon the contracting foundation of a declining external economy. The fact that this foundation, like most foundations, is not readily visible, will make the Chancellor's autumnal operations far less popular than his hopeful benevolence in the spring. The contrast in key and tune is certainly embarrassing. Within six months the Chancellor has returned to give an encore in the harshly realistic Cripps manner. However, any embarrassment involved is a Governmental responsibility. A firmer policy in April might still have needed supplementation now, but the shock would have been less cold.

Unhappily the content of the new Budget is more disturbing than its context. The only danger facing our economy is the gap between payments for imports and payments for exports, the dangerously and perpetually red figure in our foreign accounts balance. It was Mr. Butler's task to introduce selective measures that would encourage more export selling and discourage some of our import buying. Instead he has introduced collective

measures that discriminate far too little between trade that seriously affects this payments gap and trade that does not. Purchase tax, a poor fiscal weapon in all circumstances, has been used as a blunderbuss, when it might have been used as a rapier. In some cases the increases in purchase tax will reduce home demand for articles that consume imported raw materials in their manufacture; in other cases, however, this effect will be small, yet the price-raising effect of the tax change will increase the cost of living. It is by no means a certainty that all reductions in home demand will be followed by expansions in export sales. This might be hoped for, but it will be neither an automatic nor a rapid consequence. The increased tax on cars is an example of the selective fiscal tactic; it is likely to lessen home demand for new cars and it is also likely to stimulate export selling. But the general reimposition of purchase tax upon household goods is in sharp contrast. It is as likely to force the pace of inflation as to make any sizeable contribution to saving imports or raising exports.

In saying this we do not dismiss the argument that this second Budget had to take measures that would mop up some of the spending power that is a part-cause of our heavy import bills. But rising prices in the home market were already making some contribution—the sharp rise

in coal costs alone was having a fairly general effect upon retail prices. Purchase tax as a non-selective instrument raises prices illogically; it is a most dangerous form of indirect taxation whenever it falls upon genuinely necessitous purchases. It should, in our view, sharply distinguish between costs of living and costs of leisure and pleasure. Did Mr. Butler really hope that this new addition to the cost of living would not lead to a new wave of demands for higher wages? Exhortations about restraint have had little effect in the past, and there is no evidence for assuming that they will now be more fruitful.

If the Chancellor had deliberately set out to make his second Budget seem totally disconnected with the problem of our balance of payments, he could hardly have done better than to choose this occasion to introduce changes in telephone and postal charges. This triviality, whether or not it can be justified by rises in G.P.O. costs, should have been left to the next annual Budget. Unfortunately, it provides substance for the argument that the first 1955 Budget avoided unpopular changes because of the election; and this is a great pity, for the less our economic difficulties are discussed in the biased glare of party politics, the more speedily and less painfully they will be resolved. We ourselves take the view, perhaps somewhat hopefully, that British economic policy, insofar as it is related to the external problem of payments, should, like foreign policy, rise above the localised clashes of political parties and doctrines.

It is one of the Budget's few virtues that the will to grapple with the thorny problem of housing and other subsidies is firmly announced. This is not only a matter of finance; it is a matter of civic justice. The much expected analysis of agricultural subsidies has been deferred until 'the right time', and this presumably is a warning that the February price review will take place in a much tougher atmosphere. These indications of future economic action may well be far more important than fiscal measures of speedier effect. If so, the full strength of the Budget has yet to be revealed. State subsidies that encourage inefficiency or promote injustice should be relentlessly re-examined.

The increased rate of tax upon distributed company profits is, at lowest assessment, a necessary accompaniment to the Government's appeal for restraint in wage demands. Again, however, it is not a selective type of tax. It falls upon home trading and export trading companies alike. It will encourage more ploughing-back of current profits and in that effect will re-inforce the raised bank rate and the credit squeeze. Yet it is not a sound tax, for it is apt to penalise new and nationally desirable enterprises and, by comparison, to enhance the economic appeal of old and non-progressive industries. In this field, too, the fundamental problem of our economy called for the rapier rather than the blunderbuss. But it would not be fair to criticise Mr. Butler for this change in tax. It was widely expected that the increase would be greater than a mere 5 per cent. If purchase tax were increased, the tax on distributed profits also had to be increased to maintain the balance of political pressures. But it remains to be seen whether this added tax upon shareholding Paul will deter wage-earning Peter from asking for 3d. more an hour. Mr. Butler may be more hopeful than we are.

British economic history since the war has been concerned with a single problem—the balance of payments. The Labour party had to grapple with a few more payments crises than the Conservative party has—yet. The Labour party favoured controls, priorities, raw material allocations, etc., as remedial weapons. The Conservative party favours complete freedom with periodic curbs by taxation or bank rate changes; at the same time, there is a violent disavowal of any measure of economic planning that might suggest Labour party parentage. It seems more than possible that we are falling between two stools, that at the present juncture a combined operation of both kinds of remedy would have produced a far better Budget, one that was much more likely to narrow the payments gap quickly and also much less likely to accelerate the pace of inflation. We may need even more threats of economic crisis before we realise that in these matters class and party prejudices are expensive liabilities.

Notes & Comments

In Cartons or Bottles?

DATA from the US soap and detergent market are always intriguing for the detergent drive got going there some years before it started here, and whatever we may think about the advertising and coupon-offering battle in Britain, the struggle for the housewives' favours in America has been infinitely fiercer. An article in *Chemical & Engineering News* (1955, 33, 4336) reveals that liquid detergents have been climbing up in the domestic market against all experienced expectations. This in itself is strange for here one of the first detergents to become a familiar sight on the kitchen shelf was a bottle-packed liquid product, and it has held a firm place throughout the British two-front battle of detergents v. soaps and detergents v. detergents. In America experts of the cleaning product market all said that housewives could not be sold liquid detergents. So far as is known, nobody took this sweepingly negative view here. It took two years, 1945-47, for this consensus of expert opinion to be proved 'just about 100 per cent wrong'! This was achieved by General Aniline and Film's 'GLIM'. The US housewife preferred it for dishwashing to powders and bar soaps. It seems extraordinary that she should have been expected to dislike it. Apply work-study testing or thinking to the job of washing dishes and a liquid that can be poured into the washing water and speedily mixed has a definite advantage. At any rate liquid detergent acceptance was very quickly achieved in Britain, and mainly for this particular task and for this 'ease-of-use' reason.

The British Answer

SALES in 1955 of liquid detergents in the States seem likely to reach 150,000,000 pounds with a value of about \$70,000,000. This represents a 15-fold expansion since 1949. Today there are five main liquid products on the US market including the pioneering GLIM. The absence of foaming properties was a retardant factor in earlier years but, as

in this country, there has been reformulation, introducing anionics to give the soaplike foam and feel. No information was given in the US article about the differential in costs caused by the need to pack in bottles. The British answer to this problem, a very real one in such a price competitive market, has always been interesting. The main British liquid detergent offers a refund for the empty bottle. This may be common enough a practice with beer or mineral waters but it is rarely operated with bottle-packed household products. Almost invariably with such products, the glass container is 'given away', which clearly means that its cost is added to the price. There is little doubt that this system works smoothly in Britain and that it is appreciated by housewife buyers.

Traces & Tonnages

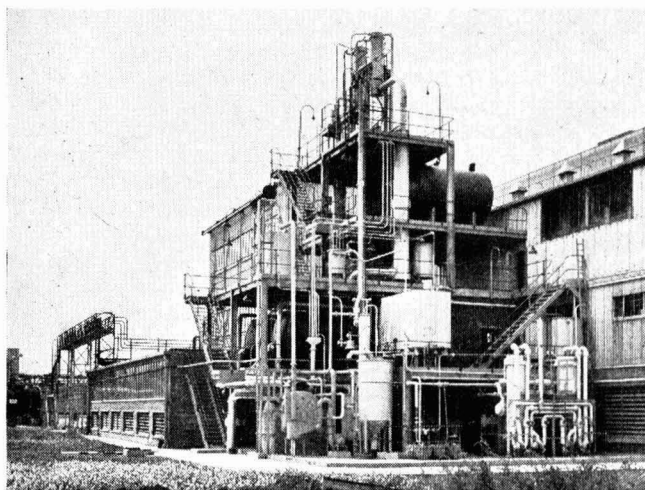
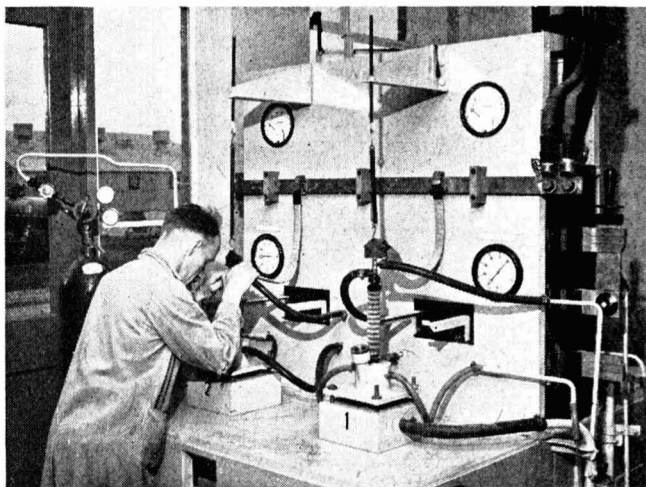
AUSTRALIAN soils in many areas are almost unique in world agriculture—their pre-cultivation history is not so much a story of accumulated fertility as one of dryness and poverty. Indeed, it is only in the second quarter of this century that some of these soils have been made capable of bearing useful crops. Mainly exposed to arid conditions, these soils have nevertheless suffered heavy losses of nutrients when violent rains have drained them of soluble substances. In particular, the trace elements have been lost. For the research worker on trace element problems Australian soils offer a wide range of opportunities. In some districts cropping was impossibly poor until it was found that the addition of a few pounds of zinc sulphate to each ton of superphosphate enabled standard yields to be obtained. In others it has been found that heavy liming, which in fact had released molybdenum from the soil reserves, could be displaced by using about half a pound of sodium molybdate per acre. In the modern agricultural world probably the only comparable cropland is that of Florida, another treasure house of nutritional deficiency problems.

Annual Consumption

ALTHOUGH trace elements are needed in such small amounts per acre, the total business they represent is already a matter of sizeable tonnage. Questions recently asked in the West Australian Legislative Assembly revealed annual trace element consumption tonnages for Western Australia only. Copper usage in fertilisers has been steadily rising. A 1952 consumption of 170 tons (as Cu) had risen to 425 tons in 1954 and was likely to be 650 tons in 1955. Zinc tonnages were almost the same for the same number of years. Manganese, a trace element whose

deficiency affects British farm crops occasionally and far more than deficiencies of copper or zinc, was much less used at 11 tons in 1952 and 18 or 19 tons for 1955. A high proportion of these materials has to be imported from other states in Australia or from other countries; as is perhaps to be expected, where soils are notably deficient of certain elements, more concentrated deposits of ores containing them are also rare. If Eastern or Middle-Eastern agriculture is ever geared to more intensive cropping standards, similar deficiencies may be revealed; by the end of this century trace element supply may be a much bigger branch of the world's fertiliser industry.

Two scenes at the titanium plant operated by the General Chemical Division of Imperial Chemical Industries Limited at Wilton. In this plant, which has a capacity of 1,500 tons and which only recently came into production, metallic titanium is extracted by reducing titanium tetrachloride by sodium. This process was developed by I.C.I. and produces granular titanium



The photograph above shows Button melting furnaces for determining hardness of titanium in the laboratory. The photograph on the left is of the distillation unit for the purification of titanium tetrachloride

Industrial Air Pollution

Alkali Inspector's Report Reviews Position

AMONG the many visits made by the Chief Inspector of Alkali, etc., Works in 1954 was one to the US from the end of April to the beginning of August in which a large number of American chemical works were toured. A report on this tour has been submitted to the Minister of Housing and Local Government says the 91st Annual Report on Alkali, etc., Works (HMSO, 3s. net).

After completing this part of the tour the Chief Inspector joined the OEEC Mission No. 136 which visited many works, installations, and research institutes for the purpose of studying American methods for the reduction of air and water pollution. The official report is still in course of preparation but in due course will be published by OEEC.

The present Chief Inspector, Mr. W. A. Damon, is retiring at the end of this year after 34 years' service in the Alkali Department, 26 of them as Chief Inspector. In a personal message Mr. Damon says, 'I would like to take this opportunity of expressing my thanks to my staff for their unswerving loyalty and devotion to duty, to my colleagues in this and other ministries for their co-operation and to my friends in industry and local government for their many kindnesses and the help they have accorded to me'. Mr. Damon said that he was convinced that a spirit of mutual confidence and goodwill between inspectors and industrialists was essential to progress in the abatement of air pollution and he hoped therefore that a policy of close co-operation rather than coercion would continue to be followed.

Suitable Action Taken

In the year under review there were 24 occasions when escapes in excess of the statutory limits were recorded and a further 69 cases where there was a failure to use the 'best practicable means' of prevention. In each case formal notification that an infraction had been made was enough to ensure that suitable action was taken and there has been no need to institute proceedings for the recovery of penalties.

A contributing factor to some infringe-

ments seems to be the fact that many plants have to work at full pressure to keep up with demands for their products, and consequently there is no time to close down while protective apparatus such as filters and precipitators is replaced. There is thus a short period in which fumes are discharged into the air without any treatment at all.

De-Dusting Facilities Unsatisfactory

Among 531 visits made by the Alkali Inspectors to industrial activities not registrable under the Alkali Act have been several to electrical generating stations. At one power station complaints were made relating to grit and dust deposition. The de-dusting facilities at the station were found to be unsatisfactory and a complete overhaul has been undertaken. When certain modifications and improvements have been completed it is believed that the plant should be capable of consistently efficient operation.

Visits were also made to the Battersea and Bankside power stations for the purpose of assessing the extent and efficiency of gas washing as practised there for the removal of sulphur oxides from the boiler waste gases.

Horizontal retort installations at gas works are the cause of many complaints says the report. At one such works it was alleged that the retort emitted a choking smell. It was found after investigation that this was due to the presence of naphthalene vapours the source of which has been traced to a plant where sulphur recovered from the coal gas is dried on hot rolls. The recovered sulphur contains some naphthalene which is vaporised in its passage over the rolls. A solution to this would be to enclose the rolls and carry the vapour through a scrubber irrigated with gas oil. The difficulty is to obtain sufficiently close enclosure of the rolls. This is an engineering problem which will have to be overcome.

Production of sulphuric acid in 1954 was 1,838,000 tons, of which about half a million tons were made by the chamber process. The use of pyrites has trebled over the past four years.

There have been a number of cases where the district inspector has had to ask for better maintenance of the plant and in one instance the state of affairs was sufficiently bad for the matter to be regarded as an infraction of the Act.

The average of all tests on exit gases from lead chamber processes made by the inspectors during 1954 showed an average acidity of 1.84 grains of sulphur trioxide per cubic foot. The number of cases where escapes were found to be in excess of the statutory limit of four grains per cubic foot was 15, the same as for 1953, but higher than the figure (6) for 1952. In 1953 and 1954 plants were operating more intensively than in 1952 and the difficulties of operation were therefore greater.

Improvement Resulted

The highest escape recorded, eight grains of sulphur trioxide per cubic foot, was due to failure on the part of the plant operator to increase the amount of nitrogen oxides when the rate of charging spent oxide to the furnaces was increased. This matter of works discipline was attended to by the management and proper conditions speedily restored.

The majority of infractions by lead chamber sulphuric acid plants appear to have been due either to carelessness on the part of operators or management or to unforeseen conditions such as abnormally cold weather or in one case to a sudden high wind which resulted in loss of control of draughting.

One case is reported where a lead chamber process was below standard and oral protests had no effect. A formal letter was sent and some improvement resulted. The general standard, however, is still not satisfactory says the report.

Two new contact process plants came into use at the end of 1954. One was an anhydrite-cement unit and the other will eventually operate on sulphur derived from a Girbotol process, acid sludge and possibly hydrogen sulphide from petroleum refining.

Where brimstone is burnt to produce sulphur dioxide one of the main criticisms is the presence of mist in the escape. One cause of this is a high bitumen content in the brimstone used. The oxidation of bituminous matter produces water vapour which later results in the formation of an acid mist which is extremely difficult to remove. Elec-

trical precipitators at one plant are reported to be giving good service although there is still a certain amount of escape. A concentration of mist as low as 0.25 grains per cubic foot is said to be quite noticeable.

Escapes from contact acid plants are subject only to the provision of 'best possible means' and no statutory limits of acidity are laid down. Certain standards have, however, been established and in 1954 there were 22 occasions when inspectors have reported tests which did not confirm to these standards, compared with 11 in 1953 and seven in 1952. This, says the report, is probably due to the great demand for sulphuric acid, which means that plants have to be operated intensively with little time for repair and maintenance.

Ammonia scrubbing was introduced at one works and the opportunity was taken to increase the rate of production of acid, relying on the scrubbing to keep the final acidity to an acceptable figure. This, says the report, is perfectly legitimate practice. Soon, however, it became evident that the cold wet washed gases were having a corrosive effect on the 300 ft. chimney through which they were discharged. Experts have expressed the opinion that the ammonia scrubbers will eventually destroy the chimney. The provision of a suitable resistant lining is being considered but this may well prove an expensive business.

Comment is made on the increase in the number of sulphide registrations, from 97 in 1946 to 124 in 1954, which, says the report, may be taken as indicative of the growth and ramifications of the chemical industry. In 1954 there were only five cases reported where conditions were bad enough to constitute an infraction of the Alkali Act. One related to the production of sulphurised oils, three to the production of carbon black and one to vulcanising of rubber.

No Complaints

At one plant, where a process is in operation for the large-scale production of a metallic sulphide, the large and very rapid evolution of gas is treated in an alkali scrubber, but despite attempts to improve the efficiency, absorption of hydrogen sulphide is still incomplete. There has, however, been no complaint from the surrounding districts.

A separate report is made by the Chief Inspector for Scotland and this is presented

to the Secretary of State for Scotland. In 1954 there were 82 works registered under the Alkali Act in Scotland, a decrease of two since the previous year. There were only three infringements of the provisions of the Act in 1954 and three complaints were received, two from local authorities and the third from a private individual. One of these complaints was not well founded says the report. In general it appears that the state of affairs in Scotland is appreciably the same as in England and Wales.

Annual Report of BSI

Heavy Demands on Staff & Services

SIGNIFICANT changes of emphasis in the scope and direction of the British Standards Institution's technical and administrative services to industry took place in the 12 months ended March 1955 says the annual report which has just been published by BSI, price 5s. to non-members.

Additional demands on the available staff are constantly arising, and the report goes on to say that more time may have to be spent in the future on measures to simplify the use of standards in practice, therefore promoting their wider application by industry and its customers.

The amount of international work required to be undertaken by BSI has also increased considerably in the last few years.

Among new fields tackled by the Institution may be mentioned atomic energy, where preliminary discussions have taken place with representatives of the Atomic Energy Authority, and air pollution; as the result of recommendations made by the Beaver Committee on air pollution the BSI have been asked to prepare a number of standards relating to the problem of smog.

In the chemical engineering section of the engineering division all outstanding problems concerning BS 1319, 'Code of practice relating to medical gas cylinders and associated anaesthetic apparatus', have been settled and the standard is about to be issued. A flush fitting pin type valve is recommended which will eliminate the possibility of a wrong gas cylinder being connected up to a supply system. This type of valve is identical with that standardised in the US.

Two important standards, BS 2455 and BS 2486, dealing with the control of boiler water, have been drawn up in the last year. It is claimed that a complete series of

British Standards now exist, enabling boiler plant managers to ensure complete and accurate control of the water used for generation of steam in boilers of all descriptions.

Other chemical engineering standards are concerned with corrosion protection by metal spraying (BS 2569), and pressure vessels (BS 1500). A standard on silver plating has been difficult to prepare because of opposition from a section of the industry.

A total of 43 new standards have been published by the chemical division and another 17 have been revised.

The standard for preferred nomenclature for fine chemicals has been published as BS 2474, 'recommended names for chemicals used in industry'. It is in two parts, the first giving recommendations on the names to be used for chemicals and the second listing terms for describing grades of the recommended names.

Recommendations on laboratory benches, laboratory services and fume extraction in laboratories are contained in a draft which is almost completed. Materials for laboratory equipment are under review.

Discussions have been held both in this country and abroad on the draft British standard on the quality of laboratory glassware. Work is in hand on the general assessment of the quality of laboratory glassware as indicated by physical and chemical tests.

James Gordon Amalgamation

JAMES Gordon & Co. Ltd., of Dalston Gardens, Stanmore, Middlesex, makers of automatic control equipment for pressure, temperature flow, etc., applied extensively for boiler control, steel furnace control, etc., and makers of reducing valves, CO₂ recorders, distance water level indicators, and other apparatus for industry, announce that to improve their manufacturing facilities and to put themselves in a position to extend the field of their activities, they have amalgamated with Hall Telephone Accessories Ltd. of Dudden Hill Lane, Neasden, London N.W.10.

Simultaneously Panellit Ltd., a subsidiary of Hall Telephones, has been formed to exploit exclusive licences of Panellit Inc., an American Company headed by Albert Sperry, a leading expert on automation, scanning systems, annunciators, etc.

FBI Publication

Publicity for British Industry Overseas

UNDER the title 'Telling Industry's Story Overseas' the Federation of British Industries has published a guide to the channels available for distributing industrial information overseas, which is believed to be the first of its kind.

The introduction states: 'The reputation of British industry depends on such factors as price, quality and deliveries. But it is not enough to-day to make good products, their excellence must also be made widely known. British industry is in the forefront of scientific and technical progress. Stories of our achievements in this field, reflected in industrial news, are a valuable aid to sales. Information about a firm's products in the newspapers or technical and trade journals, on the radio or TV or in films seen overseas helps to arouse interest in the firm's products and also helps to build up the prestige of British industry as a whole'.

It goes on to point out that of the various sources of information the most important is the individual firm—'An individual achievement is more effective than a general story, and it is on the many accounts of individual achievements that the reputation and prestige of British industry rest'.

The booklet is divided into three parts. Chapter I is a description of the final outlets for industrial information (as distinct from advertising). Chapter II describes the channels through which information may be fed to these outlets, such as news and photo-

graphic agencies, foreign correspondents, and the various services of the Central Office of Information. Chapter III consists of advice on the way in which firms can make the best use of these channels.

The booklet, of 61 pages, is published at 3s. 6d. post free.

Demand for Separators

A MILESTONE in the development of the Alfa-Laval organisation was reached when their new factory was opened at Cwmbran, Monmouthshire, on 13 October.

The increasing demand for De Laval centrifugal separators has made it necessary to build additional factory premises which have been installed with automatic machine equipment of the latest design for varying precision operations.

The development of De Laval centrifugal separators is associated with the immense expansion in so many industrial fields. From the original duty of separating cream from milk, numerous types have been developed, being manufactured in a large number of sizes ranging from the small type laboratory units to large high capacity equipments.

Alfa-Laval Co. Ltd. supply a wide range of separators for the chemical processing and allied industries which include machines for continuously separating one or two liquids and solids, and larger machines which can handle up to 20 tons per hour of liquid. Included in the De Laval range are plate heat exchangers, stainless steel pumps, and horizontal desludger centrifuges.



General view showing the workshop with assembled De Laval separators on the right

'Enforced Order' Crusher & Mixer*

(Continued)

by **DR. M. S. FRENKEL**

THIS is an extension of an article which appeared in *THE CHEMICAL AGE* of 29 October and which introduced generally new constructions of crusher, in which in connection with the feature of axial reciprocating motion helical threads in rotating inner and outer members provided the crushing effect together with the axial forward transport of the material, see Fig. 7 (1). The present part provides for the further exploitation of the reciprocating motion in further constructions in which in addition to rotating sections with helical threads there is a section or sections with axial ribs and grooves which engage all round the circumference (Fig. 1). This is shown to provide a considerable contribution to the crushing effect as well as to forward transport, and simplifies the construction.

The new construction shown in Figs. 1, 2, 3 and 4 has an inner reciprocating member 1 consisting of a helical entry-section with cylindrical outline (not shown), a conical section and helical end-section with cylindrical outline. The conical part comprises, all in one piece, the helical sections 2 and 4, and between them the section 3 with axial ribs 12 and grooves 15, representing a toothed wheel (Figs. 2 and 4).

Reciprocating Motion

Correspondingly, the outer member has the independently rotatable sections 5, 6 and 7, of which sections 5 and 7 have helical threads and the intermediate section 6 has axial ribs 14 and grooves 13 representing an internally toothed wheel, engaging that of the inner section 3. Fig. 1 shows the engagement of the sections in the expanded position of the reciprocating motion, and Fig. 3 shows the relative engagement in the completely compressed position. Figs. 6 and 7 show an example of a mechanism for producing such reciprocating motion with adjustable stroke and with spring-effect, as described in detail with reference to Fig. 9 of part 1.

The axial ribs 12 and 14 and the corresponding grooves 15 and 13 of the inner and outer member intermesh (like gear teeth all

round the circumference) for the outer section 6 to rotate the whole of the inner member 1, thereby saving a special drive for this member. In Figs. 3 and 4 the threads 12 and 14 are shown to close the grooves 15 and 13, in the axial direction as shown in Fig. 3 and in the radial direction as shown in Fig. 4, while in Figs. 1 and 2 the same members open up the grooves 15 and 13, as seen in Fig. 1 for the axial opening of 13 and of 15 (behind sectioned rib 12), and in Fig. 2 for the radial opening of groove 15, and for the upper part of groove 13 as shown dotted in the special sectional view marked F.

Rotatable Sections

It is seen that as far as rotation goes three independently rotatable sections of the outer member correspond to one piece of inner screw, rotated by the toothed engagement of the sections 3 and 6. The sections 5 and 7 may be, and preferably will be, rotated in the opposite directions to the inner member and thus to section 6, in order to produce counter-rotation of the inner and outer helical screws, in the case of opposite hand, as described for (1). There may be provided more than one such sets of three outer independently rotatable sections with one inner screw—depending on how many parts of the inner member need to be independently rotatable.

Fig. 5 shows a detail in which the ribs 12 on the inner member are shortened in the axial direction, to form a rib 12A, while correspondingly increasing the lengths of the screw-sections at 17 and 18 before and after the rib.

By reducing the axial length of the rotatable outer section to a short length as of rib 12A, thus eliminating the axial motion, the method of driving the inner member of mixers as shown in (2) is shown, which enables different sections of the inner screws of these to be independently rotated.

(1) This confers the constructional advantages:

(1) that it saves a separate motor and

**Covered by Patent Application.*

gearing for the rotatable inner member, which considerably simplifies the construction of the axial reciprocating motion;

(2) it permits the axial reciprocating motion of the inner member which provides simultaneous axial and radial relative motion of the operating surfaces, as treated later, to produce considerable crushing while reducing wear.

(3) it provides for simultaneous engagement of all the axial ribs and grooves forming the transmission all round the circumference (instead of only small-area engagement as in an ordinary gear transmission, and in connection with (2) it provides for simultaneous participation in very effective

crushing with a considerable reduction in wear.

(4) it permits the inner screw to be divided into sections which are independently rotatable, while avoiding the difficulties of internal shafts (see Fig. 8 of (2)).

(II) Advantages in performance:

Additionally to the advantages already shown in Part I for Figs. 7 and 8, there are the following:

Both on the in-stroke as well as on the out-stroke there will be crushing effects on account of the opposite velocities set up between different sections of the material in the axial relative motion, and also on account of the relative rotations.

(1) There is crushing due to the simultane-

Fig. 1 is a sectional elevation in the expanded position.

Fig. 2 is a cross-section of Fig. 1 on line II-III.

Fig. 3 is a sectional elevation in the compressed position.

Fig. 4 is a cross-section of Fig. 3 on line III-III.

Fig. 5 is an alternative detail.—1 Inner plunger, given reciprocating motion by some provision as shown for example in Figs. 6 and 7. 2 Screw section of plunger. 3 Plunger-section with axial ribs and grooves. 4 Screw section of plunger leading into cylindrical screw part. 5, 7 rotating outer screw sections, opposite-handed thread to sections 2 and 4. 6 Outer section with axial ribs and grooves, engaging inner section 3 like toothed wheel. 8, 9 and 10 Mounting and drives for sections 5, 6 and 7. 11 Gland provision. 12 Rib on inner plunger; section 3. 13 Groove in outer section 6. 14 Rib on outer section 6. 15 Groove in inner section 3. 16 Ribbing on

face of inner rib 12. F is a special section through the outer part of groove 13 in the outer section, on line FF. On the in-stroke, the material in the axial grooves is pushed and compressed in three mutually normal directions: (a) axially, (b) radially, with a kind of piston motion; and (c) in the circumferential directions, because the width of the grooves in the inner and the outer members reduces in the axial direction, towards the exit, along the cone. Thus, the minimum width of the inner groove 15 is shown on Fig. 2, where on Fig. 4, at the section III-III, the same groove 15 is seen to be wider. The same applies to the outer groove. The material interposed between engaging ribs on the inner and outer member incidentally effects, that all ribs take part in transmitting the torque, on account of these forces in three mutually normal directions, acting on the material. 12 A rib on inner plunger shortened in the axial direction. 17 and 18 Screw parts before and after this rib and coming up to it.

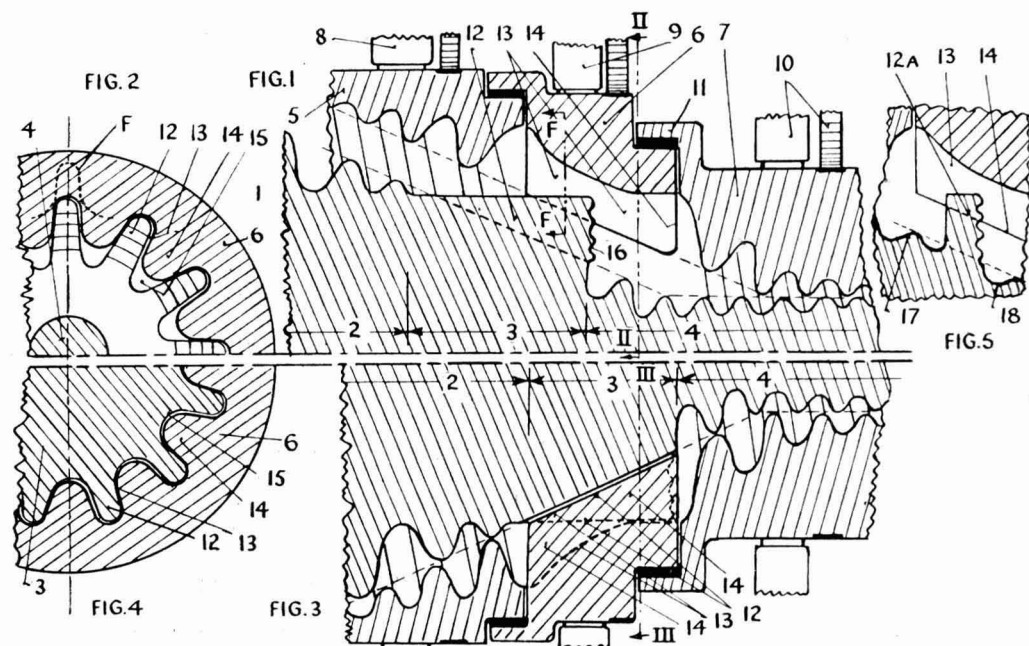
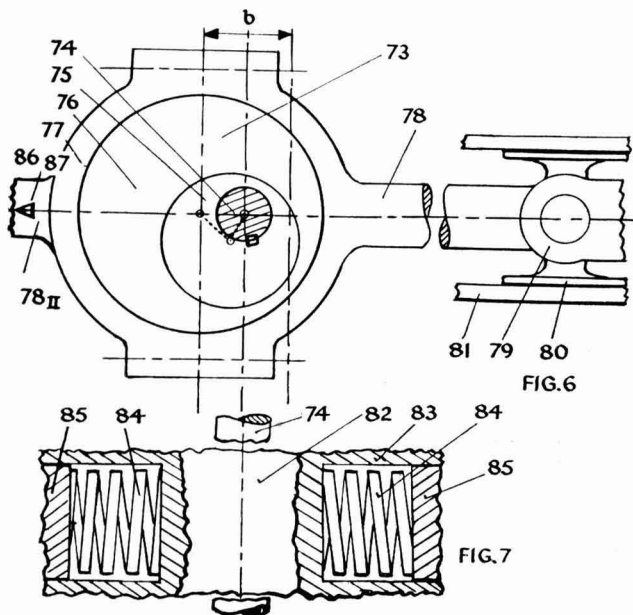


Fig. 6—Diagrammatic means for causing reciprocating motion of plunger in reciprocating crusher: 73 Means for producing axial reciprocating motion with adjustable stroke, diagrammatically shown as double eccentric set for stroke 'b'. 74 Driving shaft for inner eccentric. 75 Disc for inner eccentric. 76 Disc of outer eccentric. 77 Rim of eccentric. 78 Connecting rod. 79 Cross-head having shoes 80 on guides 81, the crosshead connecting to the plunger. 78 (II) A second connecting rod from a second rim for driving an opposite unit of crusher.

Fig. 7.—Detail of elastic mounting on the eccentric driving shaft: 74 Driving shaft of the eccentric. 82 Diagrammatic bearing means for the shaft 74. 83 Guides extending from bearing means parallel to plunger-axis. 84 Spring means acting on the bearing. 85 Abutments for spring means.



ous radial relative motion of ribs into grooves all round the circumference, in which, however, wear is minimised due to the relative axial motion which empties the grooves.

(2) The ribs and grooves have relative motion in the axial direction whereby:

(a) the material in the grooves 13 of the outer screw is pushed against a screw-thread of section 7 which has no axial velocity, and which furthermore has a different rotational velocity from the material being pushed against it, which leads to very effective crushing particularly between the front 16 of the ribs 12 and the screw thread.

(b) The material contained in the groove 15 of the inner member is moved, relative to the axial motion of the inner member, in the opposite direction thereto, and is thus impelled against the material which is being transported forward by the screw-sections 5 and 2, and further it is subjected to the impact of the screw-thread of section 5 which has a different rotational velocity. All this produces effective crushing.

(3) On the return-stroke, all the empty spaces particularly in the groove 13 of the outer member in front rib 12 are filled up. In particular the part of groove 13 in front of rib 12 is filled by material from the top part of groove 13 above rib 12 (see Fig. 1), which was full also on the in-stroke.

(a) In the case of the detail of Fig. 5, in which the rib on the inner member is only of short axial length (12A) while the engaging outer groove is of at least the axial length of the stroke, the material behind this short rib 12A, which collected during the in-stroke, is pushed on the return stroke backwards with impact against the material which is being moved forward by the screws of section 5, and is also subjected to impulse by the different rotational velocity of the thread on section 5, all of which produces crushing effect.

Lack of space prevents going into other important effects giving rise to crushing both during the in-stroke and the out-stroke.

These are the crushing effects in the section 3 with radial gearing ribs, while crushing effects as already described in part I take place in the sections before and after, and also in the final cylindrical section.

REFERENCES.

- (1) Frenkel, M. S., *THE CHEMICAL AGE*, 1955, 73, 947.
- (2) Frenkel, M. S., *THE CHEMICAL AGE*, 1955, 72, 1435.

New Chemical Factory for Eire

A factory for the manufacture of chemicals associated with agriculture is to be started in Ennis, Co. Clare, Eire. By-products will also be available for manufacturing purposes.

Chemicals Added to Food

Concern Expressed by a Number of Countries

PRIMITIVE man discovered one useful chemical substance, salt, to make his food taste better and keep longer. Modern man still uses salt, but has added to it literally hundreds of other products which are now used to flavour, colour or preserve food.

Recent surveys indicate that, in the US, over 800 chemicals have been recommended as food additives; in Sweden, 500 are in current use, and a list prepared in Germany is said to contain over 1,000 of these substances.

Faced with this flood of chemicals, a number of countries have expressed concern over the potential danger of this situation, and the World Health Organisation (WHO) and FAO were requested to investigate this very complex problem.

As a result, a joint Conference of the Food and Agriculture Organisation and WHO was held recently at the Palais des Nations under the chairmanship of Dr. Norman Wright (UK) to explore what action could be taken by the two organisations on the international level. All member countries were invited to participate in this technical exploratory conference. Twelve countries sent delegates, one an observer; while four scientific groups were also represented.

Situation Reviewed

The Conference reviewed the situation as it exists in various countries and decided that international action on food additives was necessary because:—

(a) the potential health hazards are world wide;

(b) both the less-developed and the highly-developed countries are exposed to these hazards, especially the latter, as they use a greater variety of additives;

(c) the size of the problem makes it impossible for a single country to undertake all the investigations needed;

(d) apart from health aspects, food additives affect international trade and the free movement of foods;

(e) early international action is necessary because many countries are currently reviewing their legislation on food additives;

(f) laboratory facilities for work on food additives are inadequate in most countries and international co-operation is needed to put them to their most effective use.

The first step, the Conference decided, should be to recommend uniform methods for evaluating the safety of food additives, and to formulate general principles governing their use. In addition, FAO and WHO should collect and disseminate information on pertinent legislation and on the various properties and effects of individual food additives. Finally, the two organisations should assist in the co-ordination of investigations, to prevent overlapping and duplication of research.

Of the classes of additives now in use, the Conference recommended that priority should be given to the work concerning food colours, preservatives and emulsifiers.

Uniform Methods

Food colours are generally added to make food look more attractive. Originally, they were of natural origin, but the situation has become much more complex since the synthesis of the so-called coal-tar colours. Over 2,000 of these synthetic dyes have been prepared, but, fortunately, only approximately 80 are currently permitted in foods. There is at present no internationally agreed list for either natural or synthetic colours, although attempts have been made to obtain international acceptance, in Europe, of a list of seven synthetic and five natural colours.

There are wide divergences in the legal provisions covering food colours, and early consideration of these substances is urgent, in the opinion of the Conference.

Preservatives, including antimicrobial agents and anti-oxidants, are of special value in limiting wastage and deterioration in the world's available food supplies. They are of special importance for the storage and orderly disposal of surplus commodities. Finally, they are particularly valuable in tropical areas, where storage presents special problems. As antimicrobial agents are more extensively used, especially in hot

[continued on page 1024]

Indian Newsletter

FROM OUR OWN CORRESPONDENT

IT is a hundred years since the first flakes of aluminium produced in Britain were exhibited by Michael Faraday at the Royal Institution in London and the centenary was celebrated some time back in England. In the aluminium centenary sponsored and celebrated by the Electrochemical Society, India Section, at Bangalore recently, attention was focused on the recent developments in the aluminium industry in India. The role of aluminium in the consumer industries, especially through the chemical industries, was discussed in one of the papers presented and dealt with among other things, the manufacture of alum, aluminous ferric, aluminium stearate and other products. It was pointed out that good quality bauxite need not be used in the manufacture of aluminous ferric and low grade clays could conveniently lend themselves for the manufacture of this and other chemicals by a modified process which has been developed.

In the catalytic dehydration of ethanol to ethylene, bauxite samples from the Shevaroy hills, Madras State, have been employed. Activated bauxite from the same source has been used as a drying agent for wet chlorine gas from electrolytic cells. The optimum temperature for activation of bauxite has been found by determining loss of weight, pore volume and break point at different temperatures. A temperature of 250°C has been found to be the best and the efficiency of bauxite was unaffected by repeated reactivation cycles. The structural changes which would explain the activity have been studied by examining samples activated at different temperatures in the electron microscope at magnifications up to 20,000X. It has been shown that pores running straight through bauxite are not present. Among other developments mention may be made of a new rod mill, the first of its kind in Asia, established at Kundara, T.C. State, and new smelter and rolling facilities. A Directory of Aluminium, the first of its kind, is being compiled.

* * *

A scheme for the production of sulphuric acid has been licensed by the Government of India. It is probable that the scheme may utilise gypsum in the manufacture of the

acid. While it is stated that the requirements of sulphur for the manufacture of acid would lie around 50,000 tons per year, this figure is expected to be more than doubled during the second Five Year Plan period. India has no resources of raw sulphur and the two possibilities of utilising gypsum and pyrites or recovering it from sulphur bearing minerals are not being attempted at the moment. Of course, gypsum is used in the production of ammonium sulphate. The installation of pyrite burners with a view to produce acid is under active consideration.

* * *

The Estimates Committee of the Ministry of Production, Government of India, in its 1954-55 annual report to the Indian Parliament recently suggested that the technical staff required for the new urea and nitro-chalk plants to be built at Sindri should be sent early to Italy to get sufficient training and to acquire know-how in all aspects of the work such as fabrication, erection and working of the plants. The need for building up sufficient spares was stressed. It was also felt that alternative sources of supply of gypsum should be examined with a view to obtaining cheaper supplies. The Committee has recommended setting up of an autonomous Salt Board for determining the quality, standards, production targets and export of salt.

* * *

The solvent extraction of rice bran commercially produced in India with hexane or ethyl alcohol in pilot experiments at the Central Food Technological Research Institute, Mysore, have opened out industrial possibilities of economic production in the country of rice bran oil. It is understood that a project which can employ 300 chemists and engineers besides numerous skilled workers, costing about Rs 1,500,000 (£11,250) has been drawn up for inclusion in the second Five Year Plan of India. It is estimated that about 2,700,000 tons of rice bran are produced in the country and if the bran were to be solvent extracted about 400,000 tons of rice bran oil could be produced annually, thus bringing into existence a fully fledged chemical engineering industry in the country.

The Government of India have reviewed the import policy currently. The more important articles which have been removed from the dollar area Open General Licences include some chemicals, pharmaceuticals and electrodes. In the soft currency area the items removed from Open General Licence include borax, drugs and some metals, and new items such as certain chemicals and sintered and other glassware for laboratory use have been added. Most of the items removed from the Open General Licence will be licensed liberally on the basis of previous performance.

* * *

The Indian Standards Institution have drafted a large number of standards in recent months which deal with chemicals in some form or other and a selection from them is presented here. The draft standards include ethylene dichloride (technical),

turkey red oil, tartaric acid (technical, pharmaceutical and analytical reagent), carbolic acid and naphthalene for fine chemicals and plastics, cyclohexane for paints and zinc chloride for battery and technical grade. In general the standards prescribe the requirements, methods of test and special tests based on specific properties required. Drafts on the methods of estimation of copper, magnesium, silicon and other metals in aluminium and its alloys and on the estimation of small quantities of copper, iron, manganese, chromium and zinc in proofed cotton fabrics have been evolved. The first branch office of the Indian Standards Institution has just been opened in Bombay. A Standards convention will be held this winter in Bombay when a special chemical session will focus attention on composition versus performance specifications for chemical industries in India.

Hydrogen Production

Processes Reviewed at Manchester

AT the meeting of the North-Western Branch of the Institution of Chemical Engineers at Manchester on 29 October, Mr. A. T. Grisenthwaite, B.Sc., presented a paper reviewing the processes for the production of hydrogen.

The choice of process, he said, depends on the scale of operation, the required purity and pressure of the hydrogen, and the availability of raw materials. The electrolytic process produces practically pure hydrogen but others produce mixtures of gases, mainly hydrogen and carbon monoxide, from which hydrogen is separated by the steam-iron or the water gas catalytic process. Iron ore in the steam-iron process is reduced by the mixture of carbon monoxide and hydrogen then the reduced ore reacts with superheated steam to produce hydrogen. The reducing gas passes upwards through the ore in a shaft kiln, the kiln is purged, and superheated steam is passed downwards through the reduced ore. Spent gas from the ore bed is burned to heat chequer brickwork for pre-heating the steam.

The water-gas catalytic process operates on the water gas shift reaction which is exothermic. Low temperatures favour low carbon monoxide concentrations with a

minimum steam consumption. If the gas contains much carbon monoxide two stages are used, in the first the temperature is allowed to rise to 500°C then the gases are cooled and the second proceeds at 400°C. Maximum conversion of carbon monoxide to dioxide is attained by limiting the monoxide conversion, removing the dioxide and repeating the process. Carbon monoxide in small concentrations is removed from the gas by washing with copper liquor or it may be catalytically converted to methane.

Carbon dioxide and hydrogen sulphide, if present in moderate amounts are removed by caustic soda solutions but larger concentrations are removed by water under a pressure of 10 to 50 atmospheres, small amounts of monoxide and dioxide in the final product are removed by copper liquor. Monoethanolamine solution also serves to remove the dioxide but the cost of steam for regenerating the solution is heavy if large amounts of the gas are present.

Hydrogen mixed with carbon monoxide is produced either from methane or other gaseous or liquid hydrocarbons and steam with nickel as catalyst. Partial combustion of hydrocarbons by oxygen in a refractory-lined furnace produces the mixed gases without the aid of external heat; another process partially burns methane at a lower temperature in the presence of a catalyst.

Pametrada Development

A Drybox for Handling Liquid Metals

DURING recent years liquid metals such as mercury, lead-bismuth, sodium, potassium and their alloys have been increasingly used as heat transfer media in heat exchangers of various types. The Parsons & Marine Engineering Turbine Research and Development Association (Pametrada) is interested in these metals primarily for use in the cooling of blades for high temperature gas turbines.

It is well known that sodium, potassium and sodium-potassium alloys react violently with moisture and generally ignite spontaneously in air at elevated temperatures. Furthermore, their rate of oxidation in the presence of atmospheric air is extremely high and the oxide, besides resulting in an increased attack on metal containers, increases the viscosity to such an extent as to cause blockage in many applications. It is therefore essential that these metals should be surrounded with an inert atmosphere while being handled.

During the latter part of 1954, one of Pametrada's research engineers was assigned to the Chemical Engineering Division of the Atomic Energy Research Establishment, Harwell, in order to familiarise himself with the methods and techniques of handling liquid metals. The outcome of this visit has been the establishment at Pametrada of a so-called 'dry box', the construction of which was based on the original designs at Harwell.

Helium Circulated

The apparatus consists essentially of a stainless steel container through which helium is continuously circulated. Access is provided by rubber gauntlets conveniently placed adjacent to 'armourplate' glass windows and several sizes of posting boxes are fitted to allow tools, workpieces and similar objects to be placed in or withdrawn from the dry box. A neoprene gas holder maintains the entire unit at a comfortable working positive pressure of $1\frac{1}{2}$ -2 inches water gauge. The helium is pumped through a drier and purifier and via the gas holder to the dry box in a closed circuit, so that the accumulation of any moisture or contamination of the helium is avoided.

The main purpose of the dry box at Pametrada is to fill hollow turbine blades or other

test receptacles with either sodium or sodium-potassium eutectic. A heavily damped aperiodic balance fitted with a graticule scale is used inside the box for weighing out the required quantity of alloy. This is metered directly into the blade through a porous glass filter. The blade is then sealed with a plug welded in place by means of a special welding unit which is connected to the dry box.

Corrosion Competition

THE Corrosion Group of the Society of Chemical Industry is to establish an annual competition to encourage interest in corrosion science. The competition will offer a prize of 25 guineas for the best essay or paper of about 3,000 words submitted by persons not more than 27 years of age at the closing date, 31 March, 1956, on any aspect of corrosion of metals and its prevention.

Judgment of the entries will be based on arrangement of material, technical and literary excellence, and evidence of the candidate's critical faculty and originality. It is not necessary that results of original research be incorporated, as entries may include surveys of knowledge in particular fields, discussion of practical problems, suggestions for developments in research, and the application of knowledge and organisation of corrosion-preventative measures.

Entries should be sent to: Corrosion Group Essay Competition, Society of Chemical Industry, 56 Victoria Street, London S.W.1.

Fire References

REFERENCES to Scientific Literature on Fire, part vii 1953, has just been published by the Department of Scientific and Industrial Research and the Fire Offices' Committee joint fire research organisation, Fire Research Station, Borehamwood, Herts. Altogether there are eight sections in this volume; occurrence of fire, fire hazards, initiation and development of combustion, fire precautions, fire resistance, fire fighting organisation, fire fighting appliances, and general works of reference. There are also name and subject indexes.

The Problem of Safety

Minister Emphasises Importance to Nation

SPEAKERS at the London Industrial Accident Prevention Group's Conference at the Guildhall on 28 October stressed the great economic benefits obtainable from lowering the rate of industrial accidents. The Minister of Labour, Sir Walter Monckton, said that manpower was a vital national asset and the prevention of accidents and the promotion of industrial health were most important if this asset was to be used wisely.

Other speakers included Sir Ewart Smith, deputy chairman of Imperial Chemical Industries Ltd. and chairman of the British productivity Council; A. E. Amor, deputy managing director of Kodak Ltd.; P. E. Trench, managing director of Bovis Ltd. and H. R. Payne, chairman of the National Executive Committee of the Royal Society for the Prevention of Accidents. The conference chairman was Miss M. J. E. Sturgeon, Imperial Chemical Industries Ltd., who is chairman of the London Industrial co-ordinating Committee.

Industrial Injuries

The Minister told the large gathering that nearly 20,000,000 working days were lost every year as a result of industrial injuries or through illnesses caused by occupational diseases. Every day about 60,000 people were absent from work as a result of an industrial injury or illness. The problem was large and a great amount of human suffering and individual loss was involved.

'Everyone who has had to deal with the after-effects of accidents and industrial illness', Sir Walter said, 'knows only too well that however good the arrangements for insurance and compensation may be, they rarely make good all the financial losses'.

He added: 'We must also bear in mind the effect on industrial production. This must cause special concern at this time when so much depends on raising industrial productivity to the highest possible level.'

Sir Ewart Smith's topic was 'Accident Prevention & Productivity' and he said that improvement in industrial accident prevention could make an important contribution to increased productivity. Apart from the human suffering involved, industrial acci-

dents were causing a loss of production which had serious national consequences.

Statistics were not available to determine the full cost of accidents at work, but it could be estimated that the total was likely to be much over £100,000,000 a year. Improvement should not be sought only by legal action and safety equipment; the attitude of everybody concerned was a far more potent factor. In some respects, America had a better record than Britain even though statutory regulations there were less numerous.

Sir Ewart said there should be far more industrial safety officers and better provision of safety appliances but good management with dynamic leadership from the top was of over-riding importance. This was supported by the example of a great US company which had a record over a long period of 10 per cent improvement year by year, and in which the accident rate was now less than 0.1 lost-time accidents per 100,000 hours worked.

The fixing of a target figure was an important step in reducing the number of accidents, because appreciable improvement could only be made by positive steps, vigorously taken. Management, workpeople and the community at large had a common interest. Every man must be encouraged to think of himself as, in one sense, a manager, with a vital part to play. The chain of responsibility was strengthened, in the best practice, by regular discussion meetings at all levels, conducted by line managers—an essential feature—with safety officers in support.

Accident Prevention

The problem of accident prevention needed the same analytical treatment as was provided by work study, in particular in planned maintenance. There was no inherent advantage in any particular size of firm or type of work. Small firms might have less physical resources, but they were more susceptible to good leadership. Widely differing kinds of activity had, in fact, achieved similar progressive improvement. For example, the same rate of improvement had been made in this country in a stone

Industrial Safety

mine where the accident rate has decreased between 1947 and 1955 from 15 to 1.5, and in one large manufacturing concern in the same period from 3.0 to 0.3.

Experience showed, Sir Ewart said, that the firms which were most advanced in other respects achieved the best rates of improvement in accident prevention, with frequency rates falling by as much as 10 per cent a year. Accident prevention was an integral part of the drive for higher productivity requiring the same emphasis on human values and effective leadership. If continuous advance could be measured at 10 per cent a year in some organisations, a rate of 5 per cent must be maintained on the average throughout British industry.

In his address, Mr. Amor said that accident elimination might be of greater importance to the national and industrial economy at certain times and Britain was now in a period when, because of shortage of manpower and keener world-wide competition, this was of greater importance than perhaps at any time in our history. Possibly there never was a time when the total volume of work to be done in Britain was so far in excess of total manpower. One of the ways of bridging this gap was the more efficient use of the manpower available. One of the important contributions to this end was the reduction of time lost through accidents.

Standard of Living

Competition in world markets had been getting keener in recent years; it would continue and it was obvious that hopes of maintaining or improving our standard of living depended on the retention of a reasonable portion of world markets. Several factors governed this situation but one of the most important in such circumstances was the cost of production which determined the price at which we could economically sell. With continually rising unit cost of labour, the cost factor was obviously closely related to these same factors of most efficient use of existing labour and keeping to the lowest possible level waste of any part of the labour available by the avoidance of lost time. Each of these were dependent to some degree on how successful we are in the field of accident prevention.

Closer attention to the principles of accident prevention could bring about a measure of improvement which would go far towards bridging the present gap between the man-

power at present available and our current exacting requirements. On the full solution of this problem depended our domestic prosperity and our international prestige.

Mr. Trench said that efficient management was concerned with minimising loss of all kinds, but it was also concerned with training and communications, and unless it could ensure that its policy reached the operative, it was failing in one of its essential duties. Management had all the aids but it must have the will to use them. A demonstration of enthusiasm from the top by men completely convinced not only that safety paid but that they had a real legal obligation and a real moral obligation to their fellow-men, would be the best contribution that management could make towards accident prevention.

The general foreman was a most important individual in any drive to reduce the accident rate; in his hands were two complementary factors, efficiency and morale. Synonymous with his duty to maintain good morale must be the duty to reduce the possibility of accidents to a minimum, and he must also know the right action to take in the event of an accident happening because, particularly on a building site, the right action at the right time could reduce the severity of the consequences.

Good safety habits could be formed in two ways: the hard way of experience paid for by pain and suffering and perhaps death, or the commonsense way of training and education. The building industry to-day had the choice. Both ways cost money but one was a very much better investment than the other and the efficient building firm knew which one that was, Mr. Trench concluded.

Nu-Swift London Office

New London showrooms and offices of Nu-Swift Ltd., manufacturers of fire protection equipment, have been opened at 25 Piccadilly, London W.1. Specimens of the firms products are on view and small, urgently needed, orders can be executed from this address. The headquarters of the firm remain at Elland, Yorkshire.

Safe Practice with Solvents

by HENRY ALLEN

THOSE industrial solvents. You use them in the factory in a hundred and one applications. It is necessary therefore to take a close look at the safety techniques.

There is tetrachloroethane, for instance, which figures in the making of leather, artificial silk, film for cinematography, safety glass and so on, and also plays a large part in the make-up of lacquers and resins. Its high solvent potency is a valuable property but its toxicity is strong, and for that reason Britain forbids its use in the aviation industry. Colourless and non-inflammable, tetrachloroethane can be taken into the human body by inhalation and through the skin. It is insidious in its effect and causes trouble in the digestive system, finally poisoning the liver. The nervous system can also be affected with loss of power in the limbs.

Dramatic Picture

That is the dramatic picture of course. That is what tetrachloroethane can do when it is not controlled (it has, nevertheless, frequently gone uncontrolled and statistics show the incidence of industrial fatalities through its toxicity). How is it controlled? Closed apparatus should be set up whenever possible. All operatives dealing with the solvent should wear rubber gloves. If any substitute will serve as well, use the substitute. Often amyl acetate will be equally effective and harmless. Lastly, select carefully the workers who will deal with the solvent. Anyone with a medical history including jaundice should be debarred.

Ten parts per million is given as the maximum allowable concentration of tetrachloroethane in the working atmosphere.

Tetrachloroethane is the arch poisoner, if given a chance. The others come lower down the line. They are hydrocarbons, ethers, esters, ketones, glycols, amines, nitro compounds, benzene, nitrobenzene and trichloroethylene. This last one, trichloroethylene, can act in a surprising manner, revealing new menaces.

An interesting accident was reported from Holland, where a worker attempted to clean his aluminium-dust covered overalls in a vat of trichloroethylene. Flames leapt up from

the overalls causing severe burns to the man. No open fire of any kind was in the vicinity and expert investigation of the circumstances revealed that the fire followed from the behaviour of aluminium particles in the presence of trichloroethylene. It was furthermore ascertained that the trichloroethylene contained up to 0.2 per cent of hydrochloric acid. In the presence of aluminium chloride, trichloroethylene develops a tendency to polymerise, a state of affairs which generates heat. The aluminium present melts in the high temperature and forms aluminium oxide. This is the phase when the fire breaks out.

The inference from this unexpected accident is that it is unwise to use trichloroethylene for degreasing aluminium alloy components. Safer in use for such purposes would be tetrachloroethylene. Generally speaking, the reaction between trichloroethylene and finely divided aluminium occurs when there is free acidity present in the liquor. Reaction between the acid and the aluminium forms aluminium chloride, which catalyses the reaction and is quickly formed in accumulating quantities. The reaction is therefore autocatalytic and the mass is potentially incandescent, evolving hydrogen chloride and carbonising organic matter.

Safety Points

If it is necessary to degrease with trichloroethylene, the following safety points will eliminate the hazard. Add enough soda ash every day to ensure an excess of mild alkali in the liquor; clean out the plant, regularly and often; and use a plant where it is difficult for stagnant liquor to form in which fine dust can accumulate. If these precautions are adopted, then trichloroethylene can be used perfectly safely in the degreasing of aluminium alloy components.

It has innumerable other applications in industry, being widely used in enamelling, painting, dyeing and in the extraction of fats and oils. It appears prominently in the printing trades, in the boot and shoe industry and in textile manufacture. Trichloroethylene is thus something very important in the eyes of the safety official of the factory.

But it is one of the least menacing of the chlorinated hydrocarbons in wide use as an industrial solvent. It can be dealt with.

Benzene, on the contrary, has a very high degree of hazard because of its toxic effect; it poisons the blood forming tissue of bone marrow. Benzene is important to the safety official because it can be very dangerous, yet it is in wide use as a solvent, as in the extraction of oils and alkaloids, and in the manufacture of rubber, artificial leather, dyes, paints, cellulose lacquers and paint removers.

It can be absorbed into the human body by inhalation of vapour or through the unbroken skin. Inhalation can cause giddiness, unconsciousness and finally death. Such fatal results, however, would mainly follow a major accident involving exposure to a high concentration of vapour. Chronic benzene poisoning, on the other hand, is more usual and is pernicious in its quality because it is difficult to detect until it has advanced far. Routine microscopic examination of the blood of every worker brought into possible contact with benzene should be standard practice in the factory.

No Immunity to Benzene

Where benzene is involved, the process should be completely enclosed. There is no such thing as developing an immunity to benzene and, therefore, over a long period of working, no concentration higher than zero is really safe. Ventilation should always be 100 per cent. It has been suggested that the maximum permissible concentration of benzene vapour in a workroom atmosphere should be 100 parts per million. As with tetrachloroethylene, it is often possible to use a more reliable solvent, and one offering less occupational hazard than benzene while achieving the same results. Petroleum can serve as an alternative rubber solvent, and toluene will do as well in lacquers, and methylene chloride in paint removers. This substitution is a province the safety official will do well to explore more thoroughly.

Another highly toxic industrial solvent in widespread use is ethylene chlorohydrin which appears as an intermediate product in the preparation of many chemical compounds; in the manufacture of many insecticides; in the degreasing of machinery, and as a fixative in the colour printing of textiles. Again it is readily absorbed through the skin, lungs or digestive tract. The main

Industrial Safety

risk to operators at work is through the possible absorption through vapour but it is possible too for clothing to become contaminated with it and then there is at once the risk of skin absorption. It is plain then that there must be a high standard of cleanliness. The issue of protective clothing is obviously advisable.

Poorish Record

Ethylene chlorohydrin, an excellent solvent and cleaning agent in the dyeing and cleaning industry, has a poorish record in the safety field and has been known to cause several fatalities. There is again the period of latency between the exposure and the symptoms of disease. What then are the precautions that a factory management can take? It is essential to avoid large evaporating surfaces and there must always be comprehensive exhaust ventilation. Under no circumstances should work with ethylene chlorohydrin be allowed at high temperatures because such temperatures mean increased vaporisation. The approved maximum permissible concentration has been given as 10 parts per million, although reputable authorities argue that the safer ratio is two parts per million because of the possibility of cumulative effects.

Carbon tetrachloride needs watching. It is a reliable solvent with fats and rubber, in machinery cleaning, and is also a fire extinguisher. But it can poison. It can kill. It can do irreparable damage to liver and kidneys. It must therefore come under special scrutiny in the factory. As with all the other solvents that are dangerous, good ventilation will do much to nullify the hazard—and is there a simpler or more elementary accident prevention technique? Careful selection of personnel is also very necessary—anyone with an alcoholic tendency should not be allowed to work with carbon tetrachloride. Where possible it is to be recommended that only alternative weeks are worked by operators in an atmosphere where there is, potentially, a vapour.

Carbon disulphide is another. It too can kill. And in several ways for it is not only a toxic solvent but can cause explosions and fire. Carbon disulphide, which is found in the chemical, pharmaceutical, rub-

Industrial Safety

ber and artificial silk trades mainly, evaporates at room temperature and the vapour it makes is twice as heavy as air. In its worst effects it can cause visual defects and deafness but some of its subsidiary effects are skin blisters such as are sometimes seen on the fingers of operators in viscose rayon plants.

Ventilation is the answer to many of the safety problems raised by carbon disulphide; exhaust ventilation of the best kind. Workers should alternate employment so as to avoid potential exposure over a prolonged period and there must be regular routine medical examinations. With carbon disulphide, statistics have pointed to the fact that there is a ratio between the hazard and the age of workers the old and the young being the most prone. In Britain no operator under the age of 18 may be employed on any process involving the use of carbon disulphide. Moreover, hours of work are limited to not more than five in any one day

and to not more than two and a half hours at any one stretch. Where and when possible respirators should be worn. The maximum permissible concentration is 20 parts per million and there should be routine regular examinations of the workroom atmosphere to check on the degree of concentration. As for its explosive qualities, carbon disulphide has an ignition temperature of 125-135°C. Contact with heat in the form of pipes may ignite the vapour. Foam type extinguishers should always be quickly accessible in any workroom where there is a process involving carbon disulphide.

They are treacherous things these toxic solvents which are yet so widely in use in industry as to add a high degree of occupational hazard to every factory. It is necessary for the executive responsible for the safety of the place and its personnel fully to assess this hazard and to establish the necessary precautions against it. On the whole they are simple precautions. But the vigilance must be incessant and there must be day-in day-out ruthless checking up on their adequacy.

Safety Notebook

TRIBUTES to all who were involved in the explosion in the low pressure compression plant at I.C.I.'s Billingham works on 22 September (see *THE CHEMICAL AGE*, 1955, 73, 737) were paid by Dr. I. J. Faulkner, ammonia works manager. 'The behaviour of all the people on the job, the rescue teams, and many others from adjoining plants who came to help was magnificent,' said Dr. Faulkner.

Dr. Faulkner went on to say that the help that was given was not foolhardy help. 'Safety precautions and devices that are there to be used were used and were used properly.'

As previously reported, the explosion occurred in the low pressure building where, in the initial stage of ammonia manufacture, gases are compressed to 150 lb. per sq. in. Part of one of the compressors was wrecked and the explosion fractured a

steam main carrying steam at 270 lb. per sq. in. pressure. Escaping gas caught fire but was soon extinguished by operation of the isolating valves without the fire-fighting services having to use their appliances.

The exact cause of the accident has not yet been established, but a full technical inquiry is being held. There are at present two distinct possible causes, and until the results of the inquiry are known precautions will be taken to ensure that there is no repetition of the two suspected causes.

The two employees who were killed, Mr. W. Reed and Mr. R. Barnes, had both had considerable service with the company, Mr. Reed since 1938 and Mr. Barnes since the completion of his war-time service.

* * *

THE MANUFACTURING Chemists' Association for the second consecutive year has been selected for a National Safety Council

Award, it was announced in Washington recently.

The Association Safety Awards are made annually by the NSC to those trade associations who most actively promote safety in small business. According to the NSC, the awards 'give recognition to associations for the general excellence of their safety services and for their contribution to the reduction of occupational injuries in their industries'.

In making the awards the Council's technical committee and committee of judges take into consideration accident prevention activities such as publicity, safety conferences, contests and publication of technical material.

The award, which was presented in Chicago on 19 October during the 43rd National Safety Congress, was accepted on behalf of MCA by Mr. S. M. MacCutcheon, chairman of the MCA general safety committee. Mr. MacCutcheon is director of safety, The Dow Chemical Company, Midland, Michigan.

The Manufacturing Chemists' Association represents over 90 per cent of the productive capacity of the chemical industry.

* * *

WHEREVER electrical energy is generated, transformed or used at a pressure exceeding 125 volts alternating or 250 volts direct an electric shock card must be displayed, says an amendment to Electricity Regulation 29.

A new display card giving the Holger Nielson method of artificial respiration is being marketed by Ernest Benn Ltd., 154 Fleet Street, London E.C.4, at 3s. 6d. plus 3d. postal and packing charges. In addition to showing the Holger Nielson method, which has now been officially adopted in most countries, this card lists other emergency action to be taken.

* * *

A FULL account of the fire which wrecked part of J. & J. White's Chemical Works, Rutherglen, Lanarkshire, on 6 March this year (see CHEMICAL AGE, 1955, 72, 647) is contained in the October issue of the FPA Journal, a publication of the FOC Fire Protection Association. The fire brigade were first called to a small fire in the attritor house which did little damage and was soon extinguished.

The works manager then reported that the side of the cyclone hopper was warm.

Safety Notebook

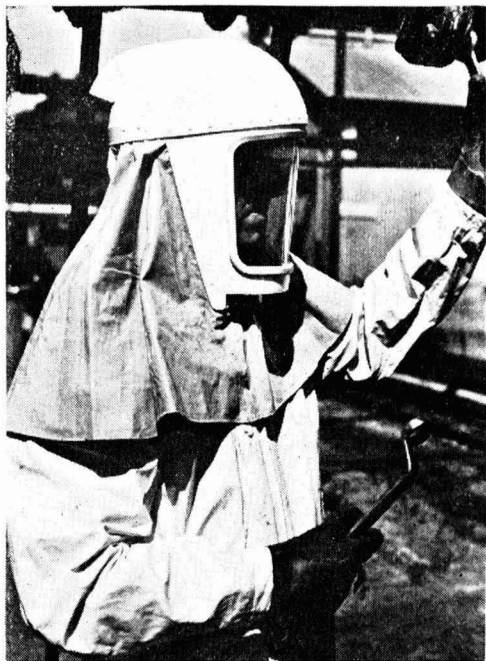
It was suspected that the pulverised fuel in the hopper was on fire and it was decided to empty it. When it was found the fuel in the hopper, although warm, was not actually on fire, emptying was suspended and the work of clearing coal dust from the upper staging, which had been discontinued, was resumed.

The atmosphere was very dense with dust, and at times the electric lights were completely obscured. The second fire occurred while the clearing operations were still in progress and the building was enveloped instantaneously in a burst of flame.

After discussing some possible causes of the fire, e.g. sparks from damaged electric and the work of clearing coal dust from the first fire, a broken fuel return pipe and sparks from the shovels used to remove



Electric Shock Card as marketed by Ernest Benn Ltd.



The RFD Updraft Protective Helmet. The helmet itself, both outer shell and face shield, are in rigid Geon PVC, which is chemically resistant, non-flammable and highly resilient. The acid-proof cape is made of PVC coated fabric. Helmet and cape ensure that the wearer is adequately protected against the hazards encountered in most chemical factories

coal dust from metal platforms, the article concludes by quoting from 'The Efficient Use of Fuel' (HMSO, 1944), p. 254. This recommends that where pulverising equipment is installed the walls should be white-washed and adequate illumination should be provided.

Also contained in this journal are some facts and figures about causes of fires and the financial loss resulting. The wastage due to fires in April, May and June of this year amounted to £7,122,000, an increase of well over £2,000,000 on the corresponding period for last year.

* * *

'FROM the neck up' is a slogan of Panorama Equipment Ltd, of London, but in this seemingly small field of activity the firm has developed a wide range of industrial safety equipment. Recently it installed its own show case in the permanent Safety

Safety Notebook

Centre exhibition in Horseferry Road, Whitehall, London. Although a great deal of the firm's research is centred on perfecting its varied range of goggles and face shields in which they have developed the use of Perspex safety glass and introduced the one-piece goggle, it is marketing fibre-glass helmets and a telescopic drill guard. The drill acrylic sheet consists of three interlocking sections and can be used on drills up to 3½ in. capacity.

* * *

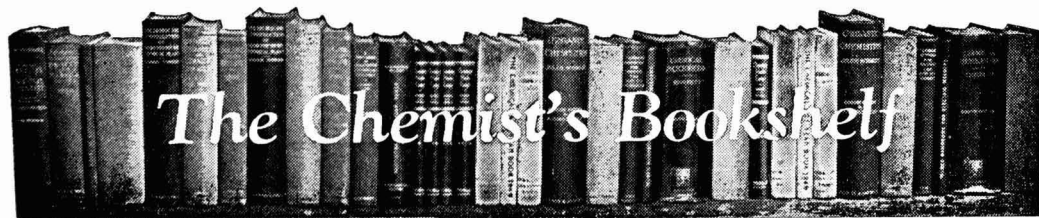
ON MONDAY, 24 October, millions of industrial workers were asked to Start a Safety Habit, for on that day a campaign organised by the Royal Society for the Prevention of Accidents for safer working in industry opened.

Six million minor and major accidents occur in industry each year, and of these 800 are fatal. By encouraging managements to provide safe working conditions and by training workers to work safely, these figures can be greatly reduced.

The campaign is receiving support from civic authorities, chambers of commerce, and industry in all parts of the country. A conference at the Guildhall, London, on Friday, 28 October (see THE CHEMICAL AGE, 1955, 73, 744), was opened by the Lord Mayor of London, and was addressed by the Minister of Labour and by three leading industrialists.

Managements have bought for free distribution to their workers nearly a million copies of a leaflet 'How to Last a Lifetime' which has been specially produced by RoSPA for the campaign. These will be handed not only to workers in factories, but to those employed on building sites and on British Railways.

Posters will be displayed in practically every large factory in the country—and in many small ones—urging workers to Start a Safety Habit Today, and to remember that Safety Habits Last a Lifetime. Especially are young workers being appealed to. Safety exhibitions, talks, and films will help to drive home the need to work safely and prevent accidents. On the Monday evening the BBC television showed a film 'The Man Who Stopped Accidents'.



THE SCIENCE OF PETROLEUM. Vol. 5. Part 3. Refinery Products. General Editors, B. T. Brooks & A. E. Dunstan. Oxford University Press (Geoffrey Cumberlege), London. 1955. Pp. vii + 397. 126s.

This is the final part of Volume 5 and completes the account of the development of methods of manufacture, analysis and testing of refinery products during the period 1937-1948. It contains 23 chapters, the first 13 of which deal with the manufacture and testing of aviation fuels, gas turbine fuels, diesel fuels, lubricants, waxes, petroleum white oils and sulphonates. The remaining chapters deal with specialised test procedures including the use of infra-red, mass and Raman spectroscopy in the petroleum industry. Although the publication of the book is several years behind the editors' original plan, it is nevertheless welcome and completes the authoritative study of developments during 1938-1948 commencing with Part I in 1950 and continued in Part II in 1953.

Each chapter is written by an expert or group of experts, and from so many excellent articles it is difficult to single out any particular one for special comment. Mention should be made, however, of the chapter on the knocking characteristics of hydrocarbons by W. G. Lovell, which contains in tabular form the available data on the engine testing of pure hydrocarbons and of the contribution of M. R. Fenske on laboratory and small-scale distillation in which are collected the operating characteristics of perforated plate, bubble cap, spinning band and other types of laboratory fractionating columns. This chapter also contains detailed drawings of equipment used in laboratory and pilot plant distillation. The chapters dealing with analysis and testing by W. H. Thomas is also of particular value and despite the rapidity of development in infra-red technique the chapter by W. J. Sweeney and B. E. Hudson, Jr., on the application of infra-red spectroscopy in the petroleum in-

dustry will be of great value to workers in this field.

The work is extensively indexed, literature references are given for each chapter and collected references on specific subjects such as methods of analysis are of particular value. The book is produced in conformity with previous volumes and is excellently produced and illustrated. It is to be hoped that the response to the completion of Volume V will encourage the editors to consider the publication of further volumes at the end of 1960.—F. MORTON.

PRACTICAL LABORATORY CHEMISTRY—A MANUEL FOR BEGINNERS. By H. G. Demming. John Wiley & Sons Inc., New York; Chapman & Hall Ltd, London. 1955. Pp. 209. 28s.

This laboratory practical book is issued in a spiral bound loose leaf form. The 8½ by 11 in. pages are further perforated to facilitate easy removal. The text itself is divided into three separate sections, the first of which deals with practical tuition in the manipulation of reagents, apparatus and chemical calculations of an elementary nature. Section two treats laws and principles. Considerable emphasis is placed on titration procedures, but very little is said of gravimetric methods. An introduction is given to inorganic column and strip chromatography, to the uses of ethylenediamine-tetra-acetic acid in water analysis, to colloids and to semimicro techniques, but in all cases, however, the introduction is only a very brief outline of what is involved, and virtually no information on technique is given. Section three selects the chemistry of the non-metals sulphur, nitrogen and the halogens for special consideration.

The text is threaded throughout with a fair amount of information on qualitative analysis of both cations and anions, but strangely enough no system of qualitative analysis is taught although this is undoubtedly one of the best ways of imparting a

knowledge of chemical reactions and practical technique to students. The section on manipulation is open to criticism on several practical details. For example both figures 25 and 58 would lead the student to operate a burette tap with the right hand and there is no correction of this point in the text. The chapter on titration does not teach the beginner how to use both hands simultaneously for burette and conical flask. Students are not told to avoid handling the bulb of the pipette as much as possible, and indeed figure 23 A illustrates the point. Several other examples exist although it must be stressed that there is much that is good in this part of the book. The button 'A' referred to in the diagram of the students balance Fig. 62 will not be found on most European balances.

The book conveys the impression of being designed specifically for use in the author's teaching laboratories and of being suited to the particular type of student received there. In actual fact the standard is well below university entrance and Higher School Certificate level.—T. S. WEST.

CHEMICAL ENGINEERING COST ESTIMATION.

By Robert S. Aries & Robert D. Newton. McGraw Hill Book Co. Inc., New York & London. 1955. Pp. xv + 263. 45s.

To the British reader this book suffers from the obvious drawback of expressing all prices in dollars. Due to differences in relative costs of labour and materials in this country and the United States, such prices are not directly convertible to corresponding sterling values. However this is not such an overwhelming disadvantage as might be expected at first sight. In particular from the students' point of view it is not the figures that are important so much as what you do with them, and here the authors have presented in chapters 1 and 2 an excellent introduction to cost estimating and a lucid explanation of the methods available.

Purchased equipment costs are shown graphically for 52 different types of plant and represent the collected data of more than 30 references. It would have been useful if a section had been included on the estimation of the cost of individual items on a weight basis including the use of 'shape factors'. The treatment of plant ancillaries such as piping, instrumentation and

structures is excellent and again extensive use is made of graphs to present the information in this section. Chapter 4 deals with manufacturing costs and contains useful data on the labour requirements for various processes, typical maintenance costs, power requirements and utilities for a number of processes and the estimated average life of equipment and complete plants.

Nearly 40 pages are taken up with a long table of chemical prices. This seems a disproportionate amount of space to devote to information which must be about the least useful and most quickly out-dated in the whole book.

The rest of the book is taken up with chapters on general expenses, profit and sales evaluation, plant location and economic evaluation. At the end there are 19 worked examples illustrating various techniques outlined in the text. Altogether it should prove a valuable introduction for the newcomer to the subject and a useful reference and source book of methods to the practising engineer. The book as a whole is well written and easily readable and the tabular and graphical data well presented. The printing and production maintain the high standard set by previous texts in this chemical engineering series.—D. C. FRESHWATER.

HISTOCHEMISCHE METHODEN. A Collection by Walther Lipp. Part 8. R. Oldenbourg, Munich. 1955. Pp. 24. DM.6.

Chemical tests for the microscopical detection of tissue components are becoming of increasing importance. Unfortunately the literature of the subject is widely scattered, much of the work being published in somewhat inaccessible journals. This series therefore performs a very useful service in providing a critical survey of the highly specialised techniques employed.

Part 8 contains a general critical discussion of the histochemistry of the proteins. Further details are given on a number of topics, including the determination of isoelectric points, the investigation of relative solubilities and the use of enzymatic hydrolysis. Basic proteins are dealt with in a separate section. The remaining pages describe a number of techniques for the detection of glycogen.

An important erratum concerning the preparation of buffer solutions described in part 2 is included on a loose leaf.—J.C.P.S.

• HOME •

New Address

From Monday, 7 November, Griffin & Tatlock's laboratory equipment division of Griffin & George Ltd., at Kingsway, London, will be closed, and all business will be conducted from their newly extended offices at Alperton, Middlesex. Tel.: PERivale 3344.

R. H. Windsor Ltd.

The previous year's record achievements were exceeded in the year to 31 March last by R. H. Windsor Ltd., manufacturers of machinery for the plastics industry. Net profits are £62,959, against £37,062, subject to tax of £39,103 (£18,636), which includes future provision based on profits for the year of £33,040.

Fertilisers & Chemicals Ltd.

In our issue of 22 October (p. 914) we inadvertently gave the address of Fertilisers & Chemicals Ltd. as 52 Pall Mall, London W.1. This should in fact have been 62 Pall Mall. The following are also directors: Mr. W. J. V. Ward, chairman of the Billingham Group, I.C.I.; Mr. Alexander Goldberg (managing director) and Mr. Paul Singer (financial director). More than £100,000 has been invested in this company by I.C.I.

Quickfit & Quartz Pay £4,779 Bonus

About 200 employees of Quickfit & Quartz, scientific glassware manufacturers, are receiving a 5½ per cent bonus—their share of the firm's profits. The sum to be distributed to employees will be £4,779. This is the last share-out for hourly-paid employees as wages will be increased to compensate for the discontinuation of the bonus scheme.

Board of Trade Notice

The Board of Trade are considering an application for drawback of import duty, under section nine of the Finance Act, 1932, on the imported vinyl acetate (monomer) used in the manufacture for export of polyvinyl acetate solutions and emulsions containing not less than 40 per cent by weight of polyvinyl acetate. Representations in regard to this application should be addressed in writing, not later than 17 November, 1955, to: Tariff Division, Board of Trade, Horse Guards Avenue, London S.W.1.

Man-Made Fibre Output Increases

Output of man-made fibres in the United Kingdom in September totalled 41,200,000 lb. to again reach the high level production recorded earlier in the year when a record output of 42,200,000 lb. was reached.

Increasing Oil Furnace Carbon Black Output

Mr. George H. Cash, managing director of Cabot Carbon Ltd., has announced details of important expansion programme now in progress at the company's works at Stanlow, Ellesmere Port. When completed the plant capacity will have been increased to 118,000,000 lb. of oil furnace type carbon blacks per year.

Ammonia in Tests to Combat Smog

Following investigations by the atmospheric pollution section of the Fuel Research Station of the Department of Scientific & Industrial Research, experiments are being carried out this winter on a possible method of combating the sulphur acids in smog. The method consists of releasing ammonia from a bottle to neutralise acids in the air.

Industrial Accidents & Diseases

Fatal industrial accidents in September in the UK totalled 136, 24 more than in the previous month, and 10 fewer than in September 1954. Of these seven were recorded from chemicals, oils, soaps and allied trades. Ten cases of lead poisoning were reported, aniline (1), mercurial (1), and phosphorus (2). Of 15 cases of epitheliomatous ulceration (skin cancer) reported from pitch and tar, and mineral oil workers, one death resulted from mineral oil. There were 11 cases of chrome ulceration recorded during the month.

Textile Institute Expanding

With the election of 149 new members at the October meeting of the Council of the Textile Institute, membership of the Institute has topped 7,000 for the first time. Membership has grown steadily over the past ten years, from an immediate post-war total of 2,300. More than half the new members joining each year are juniors or junior students (under the age of 25), and there was a record entry of over 400 for this year's examinations for the ATI.

OVERSEAS

Oil Experts to Help Indian Government

A Russian team of oil experts will arrive in Delhi in early November to assist the Indian Government in setting up an oil exploration and development organisation.

Canadian Chemicals Expansion

Chemical production in Canada last year was a record. Totalling \$921,100,000, it was 4.5 per cent above the 1953 figure of \$881,500,000. Primary plastics showed the biggest increase, being up by 13.2 per cent, followed by heavy chemicals (12.6 per cent), and toilet preparations (6.9 per cent). Exports were up by 17 per cent to \$161,000,000.

University Recommends New Weedkiller

Two new chemicals, IPC and CIPC, have passed trials at the University of Manitoba in combating wild oats and are now recommended for sale to Canadian farmers. Mr. George Friesen, research assistant in charge of the university's plant science department, recently announced details of new experimental chemicals on trial, the outstanding being PDU which applied to corn after planting successfully controls several types of weeds.

Polythene Test Laboratory

Equipment is being moved into part of the York, Toronto, paint plant of Canadian Industries (1954) Ltd. to set up a temporary polythene technical service laboratory. One of the laboratory's main purposes will be to carry out trials and demonstrations for manufacturers of polythene products. It will also provide facilities for technical assistance and will serve the function of comparing the merits of alternative processing techniques before making recommendations to customers.

Change in Nickel Price

To compensate for recent changes in foreign exchange rates and keep the domestic price of nickel in accord with basic export price, The International Nickel Company of Canada Ltd., to-day announced a change of $\frac{1}{2}$ cent per lb. in its price of electrolytically refined nickel, for consumption in Canada, increasing the price from 62 $\frac{1}{2}$ (Canadian currency) to 63 cents per lb. The price change does not alter the company's price of nickel for the UK, the US or for other markets.

Expanding Pharmaceutical Production

Polish serum and vaccine factories recently started production of three new medicines which so far have been imported. They are, Neurovaccin, Distre-taza and Gamma-Globulina.

Rhodesian Mineral Production Nears Record

Figures released on 18 October show that in the first eight months of this year minerals produced in Southern Rhodesia were valued at £13,396,000. At this rate mineral production for 1955 may total £20,000,000. Once only, since records were kept, has mineral production in Southern Rhodesia topped the £20,000,000 mark.

US Chemist Honoured

Dr. M. Starr Nichols, assistant director of the Wisconsin State Laboratory of Hygiene and professor of sanitary chemistry has been awarded the Charles Alvin Emerson Medal for 1955. Dr. Nichols and his associates developed the most important test in stream pollution studies called the biochemical oxygen (BOD) test which is now standard procedure in the US.

Polish Oxygen Plant

The oxygen plant built in the nitrogen works at Kendzierzyn, in the Opole district of Poland, and now in the final stage of technological trials, produces 1,300 cubic yards of oxygen per hour. A second plant with the same production capacity is nearing completion. This plant is being built to Soviet specifications and is equipped with the latest installations and apparatus supplied by the USSR and Czechoslovakia.

Summer Slump in US Zinc Consumption

Slab zinc consumption in the US in July dropped to 70,100 short tons, 24 per cent below the June total and 27 per cent below the record of 96,000 tons in March 1955, according to the Bureau of Mines, US Department of the Interior. Reduced consumption of slab zinc by brass mills and ingot makers during July was due chiefly to plant closures for holidays, and to copper shortages resulting from strikes at mines, smelters and refineries. The use of zinc at plants making zinc-base alloys totalled 23,900 tons, 27 per cent below June and the lowest monthly rate since September 1954.

PERSONAL

MR. J. GLYN JONES has recently joined the technical sales staff of the Sheepbridge Group and will represent Sheepbridge Alloy Castings Ltd. and Sintered Products Ltd. in the north-western area. He will operate from 48 Rydal Avenue, Sale, Cheshire. Mr. Glyn Jones was previously with PI Castings Ltd., Altrincham.

Three members of the brass products sales staff of the metals division of Olin Mathieson Chemical Corp. have been promoted. MR. E. M. GRADY, formerly manager of customer service for mill products, has been appointed assistant to the sales manager and MR. W. J. BARNARD, Jr., is to succeed Mr. Grady. MR. M. R. ROBERTS has been appointed supervisor of mill products sales, succeeding Mr. Barnard, who had held that post.

MR. ERNEST PEDLEY, M.Sc., Ph.C., senior chemist at the North-Western Forensic Science Laboratory at Preston has been appointed to succeed PROFESSOR J. M. WEBSTER as director of the West Midland Forensic Science Laboratory at Birmingham. He will take over the duties early next year. Before his appointment eight years ago as senior chemist at Preston, he was with a Manchester drug company and before that a demonstrator at Manchester University. He gained his B.Sc. degree at Manchester in 1938 and three years later became M.Sc. He is also a barrister, being called to the Bar at Gray's Inn in 1951.

In order to clear up any confusion which might have been created by the list of newly-elected officers of the Association of British Chemical Manufacturers which appeared on page 908 of our issue of 22 October, we would like to point out that DR. F. H. CARR is no longer with Boots Pure Drug Co. He retired some time ago. DR. E. V. EVANS is also retired. MR. J. L. HARVEY represents The Fullers' Earth Union Ltd., and MR. W. D. SCOTT is with Imperial Chemical Industries Ltd.

Tributes were paid to MR. H. V. POTTER, retiring managing director of Bakelite Ltd., at a party held in Grosvenor House on 31 October. MR. G. W. HODDS, who is succeeding as managing director, said that Mr.

Potter had been with the company for over 40 years and had been making synthetic resins long before the generic term plastics was adopted. Mr. Potter, who is a graduate of London University, was appointed research chemist to the newly formed Damard Lacquer Company in Birmingham in 1914, becoming manager in the following year. When Bakelite Ltd. was formed in 1927 Mr. Potter was the first managing director.

MR. JAMES A. JACKSON has been appointed a director of William Blythe & Co. Ltd., chemical manufacturers, of Accrington, Lancashire.

MR. J. G. WINDOW, sales director of Q.V.F. Ltd., suppliers of glass chemical plant and glass pipeline, will lecture on chemical engineering in glass to some 150 members of the Chemical Association at a meeting in Finland on 2 and 3 December.

New chairman of the General Council of the British Standards Institution is SIR HERBERT MANZONI, C.B.E., engineer and surveyor of the City of Birmingham since 1935. For 20 years Sir Herbert has played an important part in the development and application of standardisation techniques in the building and civil engineering industries. At the same meeting SIR ROGER DUNCALFE, chairman of British Glues and Chemicals Ltd., and well known for his industrial and public services, was re-elected president of BSI, and MR. JOHN RYAN (vice-chairman of the Metal Box Co. Ltd.) was elected as vice-president on completion of his three-year period of service as chairman of the General Council.

The appointment of MR. D. B. BENEDICT as a vice-president of Carbide and Carbon Chemicals Company, a Division of Union Carbide and Carbon Corporation, was announced on 18 October by MR. H. B. MCCLURE, president of Carbide and Carbon Chemicals Company. Mr. Benedict will be responsible for the company's long range planning in certain research and development activities, as well as all programmes on synthetic fibres. Mr. Benedict graduated from the University of Michigan in 1932 and received the degree of Master of Science in

Chemical Engineering from the same University in 1933. In the same year, Mr. Benedict began his employment with Carbide as a technical assistant in the chlor-hydrin department at the company's South Charleston, West Virginia, plant. He progressed through a number of positions at the South Charleston plant and was transferred to the New York office in November 1953, when he became assistant works manager. In June 1954 he was appointed works manager of Carbide and Carbon Chemicals Company.

MR. R. A. HENDERSON and MR. J. L. E. SMITH have joined the board of The Solartron Electronic Group Ltd.

DR. H. J. SHINE, a chemistry professor in the US, has been given a research grant of \$18,450 to study molecular behaviour. Dr. Shine is one of two Texas technical assistant professors of chemistry who received the grants which totalled \$24,700 and were given to the Texas Tech from the Robert A. Welch Foundation of Houston. Before joining the Tech faculty last autumn Dr. Shine served three years as a research chemist with the US Rubber Corp. He received his doctor of philosophy degree from Bedford College, London, in 1947. He arrives in England early next year.

MR. K. G. PATTERSON has been appointed a director of British Alkaloids Ltd., chemical manufacturers.

MR. CARYL H. MOSTYN-OWEN has been appointed a director of the Sheepbridge Co. Ltd. Mr. Owen is also a director of the parent company, the Staveley Iron & Chemical Co. Ltd.

MR. J. T. LEONARD and MR. I. M. SMALLWOOD have been appointed to the board of Carless, Capel & Leonard Ltd., of Hackney Wick, London E.9.

SIR BERNARD KEEN, D.Sc., F.Inst.P., F.R.S., has been appointed scientific advisor to Baird & Tatlock (London) Ltd. Until recently he was director of the East African Agriculture & Forestry Research Organisation. Previously Sir Bernard had been assistant director and head of the Soil Physics Department, Rothamsted Experimental Station; director of the Central Agricultural Research Institute, India; and during the war scientific advisor to the joint Anglo-American Middle East Supply Centre. He took

up his appointment with Baird & Tatlock Ltd. on a full-time basis on 1 October and is available for consultation by arrangement at the company's offices, 14-17 St. Cross Street, London E.C.1.

The board of Albright & Wilson Ltd. announce that MR. W. B. ALBRIGHT has been appointed vice-chairman with special responsibility for the associated companies of Albright & Wilson in the US (Oldbury Electro-Chemical Company), Canada (Electric Reduction Company of Canada Ltd.) and Australia. MR. S. BARRATT who is a director and the secretary of the company will succeed Mr. Albright as managing director. This change, effective 1 November, became necessary as a result of the expanding interests of the company both at home and abroad. MR. C. N. WILSON has been appointed secretary of the company.

Obituary

SIR ARTHUR DU CROS, Bt., formerly chairman and managing director and later president of the Dunlop Rubber Co., and a pioneer of the pneumatic tyre industry, died on Friday, 28 October, at his home at Oxley, Herts. Born in Dublin, January, 1871, he was trained for the Civil Service, but in 1918 joined his father and brothers in the newly founded Dunlop Pneumatic Tyre Co.

Fire from Palm Kernels

THE rate of absorption of oxygen by moist palm kernels which had previously fermented under anaerobic conditions has been studied by the Joint Fire Research Organisation of the Department of Scientific & Industrial Research & Fire Offices' Committee, who have found no evidence of the formation of reactive fermentation products able to absorb oxygen rapidly and heat the kernels, and so leading to spontaneous ignition. Conclusions are that the spontaneous ignition of palm kernels in jute bags is less likely than was originally believed, and that the observed outbreaks of fire in these materials may have been due to other causes. Results also showed that the major constituent of the gas evolved in all the anaerobic fermentations was carbon dioxide.

Publications & Announcements

A SERIES of expansion joints or bellows and convoluted couplings for use in nuclear processes and in the petrochemical and oil industries have been developed in the US by the Solar Aircraft Co. of California. Stainless steel joints range from 28 ft. in diameter to those with a wall thickness of less than 0.005 in. At Shell's Dominguez refinery a 42 in. Solar-flex expansion joint has been installed in a flue gas duct leading to the electrostatic precipitator. This unit works in an operating temperature of 575°F and a pressure of 7 psi., allowing 1 in. of offset movement and $\frac{3}{4}$ in. of axial movement. Special aeration fittings prevent solids from depositing in the bellows. These joints are also being extensively used in aircraft jet engines.

* * *

NEWEST addition to the standard range of AFS and AFS/A blowers manufactured by W. C. Holmes & Co. Ltd. is described in *Publication No. 56* just issued by the company. Named the Holmes-Connersville RBS blower it can be used on pressure or vacuum service and is an adaptation of the company's supercharging range of machines (SG type) for normal industrial purposes. In common with all Holmes-Connersville blowers it runs without internal lubrication and so delivers oil free air. Its specifications are shafts and impellers designed of one-piece construction which permits large diameter shafts and oversize bearings to be used, and fine internal clearances maintained by hardened nickel chrome molybdenum timing gears running in an enclosed bath.

* * *

METHODS employed by the US Government in producing more than 500,000 lb. of titanium are described in a Bureau of Mines report released to-day by the Secretary of the Interior. The publication tells of operations at the Bureau's pilot plant at Boulder City, Nev., when research and development work on the strong, corrosion-resistant, lightweight metal was needed by the Army and when Government production was required to supplement industry's output. The report goes into greater detail, it is claimed, than most of its type because it attempts to cover the many questions asked by scores of engineers and business men who visited the plant to study its operation.

Using what is described as a modified Kroll process, the Bureau encountered many new problems in operating on a continuous basis. One was the prevention of leaks in equipment, since an unwanted opening as small as a pinhole could ruin an entire batch of sponge titanium. The report covers every phase of the plant's design and operation. It tells of the precautions taken against fire and poisonous fumes, and describes every step in the production and purification of sponge metal. A copy of RI.5141, 'Titanium Plant at Boulder City, Nev.: Its Design and Operation', by C. T. Baroch, T. B. Kaczmarek, W. D. Barnes, L. W. Gallaway, W. M. Mark, and G. A. Lee, can be obtained from the Bureau of Mines, Publications Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa. It should be identified by number and title.

* * *

OCEANOGRAPHY, although a vast subject, cannot be called a science in its own right for it has no distinctive discipline of its own'. So said Dr. H. Barnes in a lecture, 'Chemical Aspects of Oceanography', given to a joint meeting of the West of Scotland sections of the RIC and the Scottish section of the SAC held at the Royal Technical College, Glasgow, on 26 November, 1954. A summary, necessarily superficial, is given of the present state of knowledge in this important subject starting with the concept of salinity and going on to ionic composition, nutrient elements, the nitrogen cycle, and concluding with an account of the economic aspects of sea-water. Copies of this paper are available from the Royal Institute of Chemistry, 30 Russell Square, London W.C.1.

* * *

SOME of the qualities required of a diaphragm for use in a valve are discussed in the summer edition of the *Saunders Magazine*, the House magazine of Saunders Valve Co. Ltd., Cwmbran, Mon. According to Mr. R. H. Price of the company many diaphragms are subjected to much heavier wear conditions than is a tyre. The squeeze required round the edge of a diaphragm is often greater than the squeeze on a tyre fitted to the heaviest road vehicle. A note is also given about the export department of the Saunders Company. Care is taken to

select merchants and importers only of the highest reputation in overseas markets. The references of prospective distributors are carefully checked and opinions are obtained from the agents of British industry and the Crown on the spot. This process works both ways and a 'Letter from Denmark' describes a visit to the Saunders' works made by a Copenhagen representative who wanted to gain some idea of the people he was dealing with.

* * *

SUBJECT of a new booklet produced by the M. W. Kellogg Company is the Kel-Ray projectors which are gamma ray sources for industrial radiography. All that is needed to produce radiographs is a pellet of radioactive material on one side of the object and a sheet of photographic film on the other. To make a practicable device, however, it is necessary to use some form of screening both to shut off the rays when the instrument is not in use and to produce a directional beam of gamma rays. Both these problems, which are really very similar, are solved in the Kel-Ray instruments, claim the makers. Three gamma ray sources are used in these instruments—cobalt 60, caesium 137 and iridium 192—and three models are available; the model CC which weighs about 75 lb., for pipe and field work, model CB, 250 lb., for use on pressure vessels, and model CA, 2,950 lb., for larger vessels and non-destructive testing. This booklet also includes a gamma ray intensity and film exposure guide which permits a radiographer to locate and schedule work so as to minimise the disruption of other work. Copies of this booklet may be obtained from the Metal & Thermit Corporation, 100 East 42nd Street, New York, NY, who are exclusive sales agent for Kel-Ray projectors.

* * *

SEVERAL new leaflets have recently been issued by Edwards High Vacuum Ltd., of Manor Royal, Crawley, Sussex, as supplements to their catalogue of vacuum equipment. The Philani gauge model 1 (leaflet D.153/1) is a combination of the Pirani type gauge and the Philips cold cathode ionisation type gauge. It is claimed to be a robust gauge capable of covering the widest possible pressure range in high vacuum plant of all descriptions. The two gauge heads can be used together or independently. For example, one gauge head can be used in the vacuum chamber and one in the backing line

of a vapour and rotary pump system. Precision-moulded elastomer seals have many applications for demountable vacuum connections. With properly designed mating members the O ring give high sealing pressure with minimum loading. Leaflet C.107/4 gives guidance for those wishing to construct apparatus using these seals. Leaflet C.111/3 describes a variety of needle valves for fine control and air admittance.

* * *

DETAILS of five rotary dryers recently supplied by the engineering department of Edgar Allen & Co. Ltd. are published in a *Bulletin* (No. 8) just issued by the company. One, an A.14 dryer for dealing with a wet feed of 15 tons an hour of coal containing up to 22 per cent initial moisture has been installed at the Ketton Cement Co.'s works. The final moisture content will be reduced to six per cent. At the Solway Chemical Co.'s works two A.10 dryers have been supplied to deal with anhydrite, coal or shale. The anhydrite at the rate of 20 tons an hour containing 6 per cent initial moisture, drying to under one per cent; coal at five tons an hour with 15 per cent initial free moisture, reducing to one per cent; shale at 5½ tons an hour with a 13 per cent moisture, to below one per cent. An A.10 dryer installed at Joseph Crosfield & Son Ltd.'s works will treat sand at an input rate of 20½ tons an hour containing four per cent initial free moisture which will be reduced to below one per cent moisture content. A double shell dryer of the A.12 type for drying lignite at an input rate of 6½ tons an hour with 27 per cent initial free moisture down to less than eight per cent moisture has been supplied to the Milburn Lime & Cement Co. Ltd., Dunedin, New Zealand, by Edgar Allen's agents John Chalmers & Sons Ltd.

* * *

PROTOTYPE equipment to measure the extremely low concentration of oxygen in the water fed to steam turbo-electric sets is described in a new leaflet (Sheet 323) published by the Cambridge Instrument Co. Ltd., 13 Grosvenor Place, London S.W.1. The analysing unit of this equipment is based on polarographic principles. When a small potential is applied between two electrodes immersed in water which has been rendered conducting, a current will be produced whose value depends upon the concentration of reducible substances in the water.

Law & Company News

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages & Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary but such total may have been reduced.)

CHEMICAL ENGINEERING CONSTRUCTION (PENSNETT) LTD., Stourbridge.—3 October. £2,000 charge, to A. Shakespeare, Kingswinford; charged on land, factory and premises at Coombs Road, Halesowen.

CLERKENWELL METAL WORKS LTD., London W.—29 September. £1,000 debenture No. 1 and a collateral charge by way of further security, to H. Ephraim, London, and £4,185 debenture No. 2 and a collateral charge by way of further security, both to C. Unterman, London; respectively a general charge and charged on leasehold Darnoc House, 35, 36, and 37 Alfred Place, W.C., and specified machines, tools, etc., in each case. *Nil. 30 December, 1954.

UNITED SULPHURIC ACID CORPORATION LTD., Widnes.—29 September, charge supplemental to a Trust Deed dated 5 October, 1951; charged on land adjoining Fidlers Ferry Inn, Penketh, with buildings, fixed plant, machinery, etc., and on various grants of easements obtained by company in connection with its Green Oaks Works, Tan House Lane, Widnes. *£3,000,000. 27 October, 1954.

Satisfaction

RICHARD WILSON & SON LTD., Bury, fertiliser manufacturers, etc.—Satisfaction, 7 October, of charge registered 14 October, 1952.

Increases of Capital

B.I.P. CHEMICALS LTD., Popes Lane, Oldbury, Birmingham, increased by £450,000, in £1 ordinary shares, beyond the registered capital of £50,000.

C. E. RAMSDEN & CO. LTD., colour & chemical manufacturers, potters' & general

merchants, etc., King Street, Fenton, Stoke-on-Trent, Staffs, increased by £80,000, in 40,000 seven per cent cumulative preference shares of £1 and 400,000 ordinary shares of 2s. each, beyond the registered capital of £20,000.

WILLIAM R. WARNER & CO. LTD., manufacturers of pharmaceutical preparations, etc., Power Road, London W.4., increased by £120,000, in £1 ordinary shares, beyond the registered capital of £110,000.

New Registrations

Shamrock Superphosphate Industries Ltd.

Private company (15,734.) Registered in Dublin. Capital £300,000. Subscribers (Each with one share): Gerard F. Van Den Dergh, and Maurice E. Veale.

Transparent Plastic Containers Ltd.

Private company (556,480.) Capital £100 in £1 shares. To carry on the business of manufacturers, moulders and fabricators of and dealers in plastics substances and materials of all kinds, bottles, boxes, cartons and containers, etc. Directors: Noel G. Machin and Eric H. Morgan. Reg. office: Watery Lane, Small Heath, Birmingham.

Overseas Fumigants Ltd.

Private company (556,475.) Capital £5,000 in £1 shares. To carry on the business of wholesalers, retailers, importers and exporters of and dealers in insecticides, vermin destroyers and fumigating preparations of all kinds, etc. Subscribers (each with one share): Alan G. Staplehurst and James H. Moore. Reg. office: 3 Throgmorton Avenue, London E.C.2.

E. F. Roscoe & Company Ltd.

Private company (556,388.) Capital £10,000 in £1 shares. To carry on the business of metal, chemical, oil and oilseed, ore and mineral merchants, etc. Subscribers: E. F. Roscoe and O. E. Franklyn. Solicitors: Crawley & de Reya, 158 Fenchurch Street, London E.C.3.

Webber Pharmaceuticals (Ireland) Ltd.

Private company (15,756.) Registered in Dublin. Capital £3,000 in £1 shares. To import, export, process for sale and manufacture medical and veterinary compounds, drugs and other chemical products, etc. Subscribers (each with one share): Ronal F. Eggers and Geo. H. Eggers.

Next Week's Events

MONDAY 7 NOVEMBER

The Chemical Society

Oxford: Physical Chemistry Laboratory, South Parks Road, 8.15 p.m. 'Fluorocarbons—The Basis of a New Chemistry' by Dr. R. N. Haszeldine.

Leeds: Chemistry Lecture Theatre, The University, 6.30 p.m. Royal Institute of Chemistry Lecture, 'Antibiotics—Past, Present and Future' by A. L. Bacharach, M.A., F.R.I.C.

Society of Chemical Industry

London: Burlington House, Piccadilly, London W.1, 6.30 p.m. Joint meeting with the Association of Public Analysts. 'The United States' Federal Food, Drug and Cosmetic Law', by Charles Wesley Dunn, B.A., M.A., LL.B.

TUESDAY 8 NOVEMBER

The Institute of Metals

London: The Royal Institution, Albermarle Street, W.1, 8.30 p.m. Special lecture, 'The Shape of Grains in Single-Phase and Two-Phase Alloys' by Professor Cyril D. Smith, Sc.D., Director of the Institute for the Study of Metals.

The Society of Instrument Technology

Manchester: College of Technology, 7.30 p.m. 'The Future of Semi-Conductors in Industry' by D. D. Jones, M.Sc.

WEDNESDAY 9 NOVEMBER

The Institute of Fuel

London: The Institution of Civil Engineers, Great George Street, S.W.1, 5.30 p.m. 'Chimneys and the Dispersal of Smoke' by J. E. Hawkins and G. Nonhebel.

The Society for Analytical Chemistry

London: The Feathers, Tudor Street, E.C.4, 6.30 p.m. Microchemistry Group discussion, 'The Determination of Carbon and Hydrogen'.

Birmingham: Mason Theatre, The University, Edmund Street, 7 p.m. Discussion on 'Spectrophotometric Titrations' to be opened by S. J. Clark, B.Sc., Ph.D., A.R.I.C.

The Society of Instrument Technology

Sheffield: The University, St. George's Square, 7 p.m. 'Instrumentation of a Nuclear Power Plant' by K. R. Sandiford.

The Institution of Chemical Engineers

Birmingham: The Midlands Institute, 6.30 p.m. 'Handling of Alcohols and Other Solvents' by F. H. Walmsley.

THURSDAY 10 NOVEMBER

Society of Chemical Industry

London: Geological Society, Burlington House, W.1, 6.15 p.m. 'Disease Resistance in Plants' by Dr. N. F. Robertson.

The Fertiliser Society

London: Royal Society of Arts, John Adam Street, Adelphi, W.C.2, 2.30 p.m. 'Compound Fertiliser Formulation' by Dr. R. Stewart, to be followed by a discussion.

Society of Cosmetic Chemists

London: The Royal Society of Arts, John Adam Street, Adelphi, W.C.2, 7.30 p.m. 'Spectroscopy and Microscopy' by R. Barer, M.C., M.A., B.Sc., M.B., B.S.

The Royal Institute of Chemistry

London: Acton Technical College, Acton High Street, W.3, 6.30 p.m. 'The Extraction and Refining of Precious Metals' by C. Johnson, O.B.E., M.A.

FRIDAY 11 NOVEMBER

The Royal Institute of Chemistry

Maidenhead: Courtaulds Research Laboratory, 6.30 p.m. 'Properties of Polymer Solutions—(1) Rheology, (2) Liquid Crystals' by B. A. Toms, M.Sc., D.Sc., and Conmar Robinson, Ph.D., F.R.I.C.

Institution of Chemical Engineers

London: Caxton Hall, Westminster, S.W.1, 6.30 p.m. 'Air Cooled Heat Exchangers' by D. Kaye.

The Chemical Society

Edinburgh: North British Station Hotel, 7.30 p.m. 'Hydrogen-Transfer Reactions' by E. A. Braude, Ph.D., D.Sc., F.R.I.C.

Society of Chemical Industry

London: Chemistry Lecture Theatre, King's College, Strand, W.C.2, 7 p.m. 'The Procurement of Some Hitherto Rare Metals' by A. R. Powell, F.R.S.

Strike Ends at Cork Chemical Plant

The month-old stoppage of work at W. & H. M. Goulding Ltd., chemical manure manufacturers, Cork, Eire, has ended following an agreement on proposals put forward at a conference under the chairmanship of the Lord Mayor of Cork, Alderman McGrath, T.D. About 130 men were involved in the dispute about the condition of the burners, and the firm has agreed to install more modern burners in June next year.

PERMUTIT

ION EXCHANGE MATERIALS

Ion Exchange today performs many tasks in industry, and Permutit manufactures a wide range of these materials. Their application in roles distinct from water treatment has resulted in the development of numerous new industrial processes giving improved results and lower running costs. Some of the materials now available, with their characteristics, are shown below.

ZEO-KARB Na A sulphonated coal product containing both strong and weak acid groups.

ZEO-KARB 215 A nuclear sulphonated phenol resin containing also hydroxyl groups.

ZEO-KARB 225 A unifunctional cross linked sulphonated polystyrene resin in bead form of high capacity and exceptional chemical and physical stability.

ZEO-KARB 226 A unifunctional cross linked methacrylic acid resin in bead form containing only carboxyl groups as the ion active groups.

DE-ACIDITE E A high capacity anion exchange material of medium basicity.

DE-ACIDITE FF A unifunctional very highly basic anion exchange resin in bead form based on cross linked polystyrene and containing quaternary ammonium groups.

DE-ACIDITE G A unifunctional weakly basic exchange resin in bead form based on cross linked polystyrene and containing diethylamino groups.

DE-ACIDITE H A material similar to "De-Acidite G" but containing dimethylamino groups.

BIO-DEMINTROLIT A mixed cation and anion exchange resin for demineralisation in a single column.

DECALSO F A synthetic sodium aluminium silicate suitable for the separation and concentration of vitamins and hormones.

DECOLORITE-

ASMIT A resin of high porosity for removing colour from solutions.

PERMAPLEX C-10 A highly selective cation exchange resin membrane containing SO_3H groups.

PERMAPLEX A-10 A highly selective anion exchange resin membrane containing quaternary ammonium groups.

For full technical information please write to:—

THE PERMUTIT COMPANY LIMITED

Dept. V.A. 150, Permutit House, Gunnersbury Ave., London, W.4. Tel: CHiswick 6431

Metals at Low Temperatures

TO BRING to the attention of metallurgists aspects of a recent low-temperature conference in Paris that related to metals, the metal physical committee of the Institute of Metals has arranged a meeting to be held in London.

After a short introduction by Sir Francis Simon, C.B.E., F.R.S., Professor of Thermodynamics, the Clarendon Laboratory, Oxford, explaining why low temperatures are becoming of increasing importance to the metallurgist, Dr. P. L. Smith and Dr. H. M. Rosenberg, of the Clarendon Laboratory, will make individual reports on the recent Paris conference.

The meeting will be held at 4 Grosvenor Gardens, London, S.W.1, on Wednesday, 7 December 1955, at 6.30 p.m. Visitors will be welcome.

Chartered Exploration Ltd.

Chartered Exploration Ltd., a company formed by the British South Africa Co., which holds title to all mineral rights in Northern Rhodesia until 1986, has begun an extensive search for minerals of all kinds. The geological work in the search is being carried out under the technical direction of the Anglo-American Corporation of South Africa, and the scheme is backed by £1,000,000 capital.

Chemicals Added to Food

continued from page 1002

climates, they should be given higher priority.

Emulsifiers are of special significance in relation to bakery products, which form one of the main staple foods of many people.

The Conference was not concerned with chemicals unintentionally added to food—for instance residues of agricultural chemicals, such as insecticides—but considered that they merit attention, and laid special stress on the importance of establishing analytical methods for such residues in food-stuffs. It was glad to learn that FAO, ILO and WHO were already dealing with this subject and that a special study group would consider the problem next year.

The following countries participated in the

Conference: Canada, Denmark, Egypt, France, Germany, Luxembourg, Netherlands, Norway, Sweden, Switzerland, United Kingdom, US. Australia sent an observer.

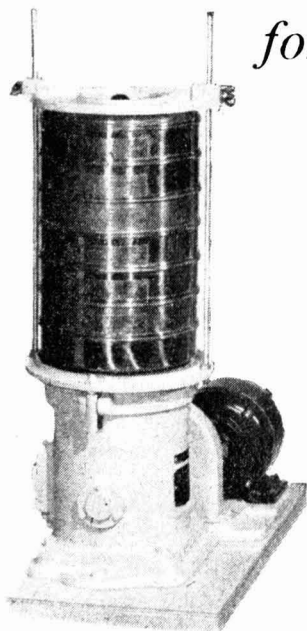
The following organisations were also represented: Commission Internationale des Industries Agricoles (CIIA), Comité International Permanent de la Conserve (CIPC), Union Internationale Contre le Cancer (UICC), Deutsche Forschungsgemeinschaft (DFG).

Market Reports

LONDON.—Conditions on the industrial chemicals market show very little change on the week, either as regards activities or prices. The flow of new buying orders from home users continues to be on a good scale and inquiries for shipment have been fairly good with India and other Commonwealth countries very prominent. Quotations in all sections of the market remain steady with a firm undertone. The demand for the coal-tar products is keeping pace with production and creosote oil remains in good request. Cresylic acid is being called for in good quantities and a fairly substantial demand for ATS quality has been reported.

MANCHESTER.—Heavy chemicals are meeting with a steady call for contract deliveries on the Manchester market, with fair aggregate quantities being absorbed by the textile and allied trades. Replacement buying by home consumers is on a satisfactory scale and in view of the firmness of prices users are not hesitating to cover themselves as the need arises. A fair inquiry on export account is reported. Taking the fertiliser section as a whole, moderate activity continues. Most of the light and heavy tar products are moving steadily into consumption.

GLASGOW.—The Autumn Budget may have had an effect on the Scottish market, as during the earlier part of the week trade in most sections of the industry was quieter. However, towards the latter part a rather improved position has to be reported. No important changes in prices have taken place. On the agricultural side the seasonal demand has been consistent. A fair volume of inquiries are still being received for the export market, and the general position is slightly better.



for accurate screen analysis...

of powders, etc., it is essential to obtain a perfect segregation of the particles. The machine for the purpose is the Inclyno Test Sieve Vibrator.

This scientifically designed instrument incorporates patented mechanism that presents the whole area of the mesh to the material at all possible angles.

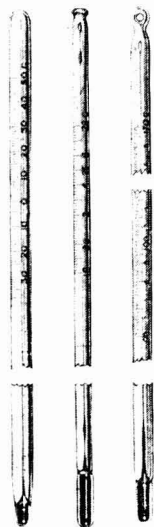
Screen analysis with the Inclyno is accurate and obviously better than hand sieving. The machine is operated by a fractional h.p. motor, and, when fitted with an automatic time switch, tests can be carried out over periods up to 60 minutes.

INCLYNO

TEST SIEVE VIBRATOR

Write for List H611

THE PASCALL ENGINEERING CO LTD · 114 LISSON GROVE · LONDON · NW 1



ZEAL
REGD TRADE MARK

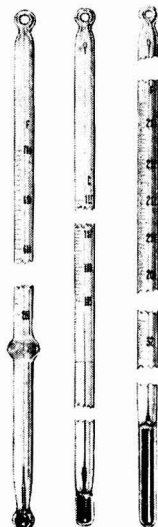
THERMOMETERS



CHEMICAL THERMOMETERS



HYDROMETERS



PHONE :
LIBERTY
2283-6

G. H. ZEAL LTD.

GRAMS :
ZEALDOM
SOUHPHON
LONDON

LOMBARD RD., MORDEN RD., MERTON, LONDON, S.W.19.

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive, or a woman aged 18-59 inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order, 1952.

BORAX CONSOLIDATED, LIMITED, has vacancies for several **SENIOR and JUNIOR CHEMISTS** with degree or equivalent to carry out in their London Laboratory basic and industrial research in **INORGANIC and PHYSICAL CHEMISTRY**. Excellent working conditions. Five-day week. Free lunches. Generous pension scheme, etc. Salary commensurate with qualifications and experience. Give fullest details, which must be in writing, and address in confidence, to Staff Manager, Borax House, Carlisle Place, S.W.1.

GRADUATES in **MECHANICAL and CHEMICAL ENGINEERING** required for progressive positions in the Research, Design and Production Divisions of **THE POWER-GAS CORPORATION LIMITED**. Training given to men without previous industrial experience. Apply to:—**STAFF PERSONNEL MANAGER, PARK-FIELD WORKS, STOCKTON-ON-TEES**.

HUNTINGTON, HEBERLEIN & CO., LTD.,
(a Subsidiary of Simon-Carves, Ltd.)
have vacancies for:

1. **SENIOR DESIGN STRUCTURAL DRAUGHTSMEN**; experience in the design of bunkers, steel frame buildings, light structures, etc.
2. **SENIOR MECHANICAL DESIGN DRAUGHTSMEN**; experience in design of mechanical handling equipment an advantage.

Good working conditions, 5-day week, 3 weeks' holiday, pension scheme and luncheon vouchers. Commencing salary depending on experience, age, etc.

Write full personal details:

STAFF DEPARTMENT,
114, CROMWELL ROAD, S.W.7.

THE POWER-GAS CORPORATION, LTD.,
STOCKTON-ON-TEES

Offer employment for
CHEMICAL ENGINEERS
as follows:—

One newly qualified graduate in Chemical Engineering. One Chemical Engineering Graduate with five years' experience of chemical plant and processes, preferably with companies producing a wide range of products. Applicants will be required to work in specialised section of Chemical Plant Division dealing with crystalliser and allied plant. The duties of the section include design work, technical negotiation of contracts, and the starting up of new plants. The men appointed must be prepared to travel widely and for men of the right calibre there is every opportunity of rapid promotion to project engineer grade.

Salary according to age, experience and qualifications.

Apply, giving full details to
STAFF PERSONNEL MANAGER

INDUSTRIAL CHEMIST required by leading container closure manufacturers in Midlands. Progressive position requiring knowledge metal printing, varnishing, stoving, and metallurgy, associated with food packaging industry. Maximum age 35 years.—Written applications, with details of experience previous appointments, etc., to **P. A. METAL CLOSURES LTD., BROMFORD LANE, WEST BROMWICH, STAFFS.**

FOR SALE

CHARCOAL, ANIMAL AND VEGETABLE
horticultural, burning, filtering, disinfecting,
medicinal, insulating; also lumps ground and granulated;
established 1830; contractors to H.M. Government.—
THOS. HILL-JONES, LTD., "INVICTA" WORKS,
BOW COMMON LANE, LONDON, E. TELEGRAMS:
"HILL-JONES, BOCHURCH LONDON." TELEPHONE:
5285 EAST.

MORTON, SON AND WARD, LIMITED,
offer

BROADBENT HYDRO EXTRACTORS

8 New 36 in. diam. galvanised baskets, electrically driven through centrifugal clutch. Safety interlocks.

6 New 36 in. diam., same as above but belt driven.

10 New 21 in. diam. galvanised baskets, electrically driven through centrifugal clutch. Safety interlocks.

8 New 21 in. diam., same as above but belt driven.

**ALL THE ABOVE ARE STILL PACKED
IN MAKER'S ORIGINAL CASES AND
ARE ON OFFER AT UNREPEATABLE
PRICES.**

MIXERS

New "MORWARD" "U"-shaped Vessels made to requirements in stainless steel or mild steel. Jacketed or unjacketed, with or without mixing gear.

50/100g. Heavy Duty **MIXERS** by **FALLOWS and BATES**, agitators driven through bevel gears from fast & loose pulley.

JACKETED PANS

NEW 100g., 150g. and 200g. in mild steel for 100 lb. w.p., with or without mixing gear.

SECOND-HAND PANS, MIXERS, etc., available from stock—all in good condition.

PUMPS

A selection of new **MONO** and other second-hand **PUMPS** in stock, 2 in. to 5 in.

MORTON, SON AND WARD, LIMITED,
WALK MILL,
DOBCROSS, NEAR OLDHAM,
LANCS.

Phone Saddleworth 437.

ONE S. J. WERNER MIXER with pan approx. 2 ft. by 2 ft. of the tilting type.

Two steam jacketed **CAST-IRON FILTER PRESSES**, each with 38 s.j. plates and 39 frames, cake size 2 ft. 4 in. square.

Several Johnson **CAST IRON FILTER PRESSES**—various sizes and types.

GARDNER MIXERS and Mixers and Sifters combined, sizes "B," "G," "H" and "I."

HYDRO EXTRACTORS, 24 in. 30 in. and 36 in.

Two 18 in. **KEK PLATE MILLS**, with feeders, delivery bins, motors and entablature.

Two No. 4 **SUPER MIRACLE MILLS** with motors and starters.

Two Single effect **EVAPORATORS** by Scott with pumps and motors.

1 Gardner s.j. **MIXER**, trough 6 ft. by 3 ft. by 3 ft., complete with motor and reduction gear.

3 Copper Lined s.j. Pans, 60 lbs., pressure.

RICHARD SIZER, LTD., ENGINEERS, HULL.

Tele: 31743

600

HORIZONTAL Steam-Jacketed DRIER by Passburg—23 ft. by 4 ft. diam. Fitted revolving reel of ten 4 in. diam. tubes around central tube, steam heated. Intermediate paddles for agitation. Jacket w.p. 2 ats. With condenser, wet vacuum pump & fittings.

Four New **TWIN-ROLL SPRAY DRIERS**. Chilled cast-iron rolls 40 in. long by 32 in. diam., 74 lb. sq. in. w.p. Fitted air-cooled doctor blades, rotary disc, distribution trough, air spray jets and worm discharge conveyors. Fitted stainless steel feed pump, jacketed feed tank and powder dresser.

Plaudler **MIXER**—4 gal. feed tank, blue glass-lined 12 in. diam. by 12 in. deep, fully jacketed with 3 kW. immersion heater. 25 gal. blue glass-lined mixer 23 in. diam. by 22 in. deep, with four 3 kW. immersion heaters. Gate-type agitators motorised 400/3 50.

30 gal. Copper. Steam-jacketed **TILTING BOILING PAN** by Postranesky—30 in. diam. by 20 in. deep. Jacket pressure 40 lb. sq. in.

BALL MILL—34 in. by 24 in., with Doulton stoneware body, 6 in. diam. central outlet and bolted cast-iron endplates. Pulley drive. Pebble charge included.

New **STAINLESS STEEL STORAGE VESSELS & TANKS**—capacities 8-100 gal.

New **PORCELAIN & SILEX lined BALL MILLS**—capacities 9-260 gal.

GEORGE COHEN SONS & CO., LTD.,
WOOD LANE, LONDON, W.12.
Tel.: Shepherds Bush 2070, and
STANNINGLEY, NR. LEEDS.
Tel.: Pudsey 2241.

ONE OVAL-SHAPED DISINFECTOR by Manlove & Alliott. Inside measurements, 30 in. by 50 in. high by 7 ft. long, steam jacketed, with hinged door each end. 30 lb. p.s.i. pressure. £80. **THOMPSON & SON (MILL-WALL), LTD., LONDON, E.14 (TEL. EAST 1844).**

PHONE 98 STAINES
TWO CAST-IRON ENAMELLED JACKETED ENCLOSED MIXERS by "Cannon"—30 in. by 36 in. deep. Geared 400/3/50.

500 gal. **LITH COTE-LINED JACKETED VESSEL**. **JACKETED LABORATORY ENCLOSED AUTOCLAVE**—9 in. by 9 in.

2,000 gal. Four comp. **STEEL VEHICLE TANK**.

Unused **ELECTRIC STIRRERS**— $\frac{1}{2}$ h.p., 400/3/50. **STIRRERS or EMULSIFIERS**—stainless steel and chrome, $\frac{1}{2}$, $\frac{1}{4}$, 1 & 2 h.p. A.C.

FILTER PRESSES—30 in., 25 in., 18 in., 15 in. & 9 in. sq. plates.

"Z" & **FIN BLADE MIXERS**: also **CYLINDRICAL JACKETED MIXERS & PANS, AUTOCLAVES, OVENS, DISINTEGRATORS, REFINERS, PUMPS, CONVEYORS, EXTRUDERS, TANKS, DIESEL & STEAM PLANT**, etc.

HARRY H. GARDAM & CO., LTD.,
STAINES.

TEFLON! Ask for our price list for Joints, Strips, Rods, Discs, Valves and the newest cloth made of **TEFLON**. **MACHINERY (CONTINENTAL) LIMITED**, 175, Brompton Road, London S.W.3. Telephone: Kensington 6228 (three lines).

15 Sulphuric Acid Tanks for sale, as removed from rail wagons. $\frac{3}{4}$ in. plate, welded construction. 15 ft. 6 in. long by 5 ft. diam. Manhole, etc. Excellent condition. **BOX NO. C.A. 3436, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

WORK WANTED & OFFERED

BLENDING and Pulverising of Minerals, Colours, Chemical Salts, Gums, Wax, etc. **DOHM LTD., OFFERTON, STOCKPORT.**

CRUSHING, GRINDING, MIXING and DRYING for the trade.

THE CRACK PULVERISING MILLS LTD
Plantation House,
Mincing Lane,
London, E.C.2.

GRINDING, CRUSHING AND GRADING

FINE GRINDING LTD.,
BLACKHOLE MINE, EYAM
TELEPHONE: EYAM 227

PULVERISING of every description of chemical and other materials for the trade with improved mills, wharfage, and storage facilities. **THOS. HILL-JONES, LTD., "INVICTA" WORKS, BOW COMMON LANE, LONDON, E.** **TELEGRAMS: "HILL-JONES, BOCHURCH LONDON."** **TELEPHONE: 3285 EAST.**

BUSINESS OPPORTUNITIES

EXTRUSIONS BY MARLEY

BUYERS requiring rigid and flexible tubes and sections in thermoplastic materials, should ask for a quotation from

MARLEY EXTRUSIONS, LTD.,
DEPT. 153
LENHAM,
MAIDSTONE,
KENT.

Harrietsham 381.

FRANCE. Manufacturers of Industrial Plasticisers, and Chemical or Pharmaceutical Organic Materials, would be willing to manufacture products in France against royalties. Preliminary inquiries to **BOX NO. C.A. 3437, THE CHEMICAL AGE, 154, FLEET STREET, LONDON, E.C.4.**

PATENTS

THE Proprietor of British Patent No. 679912, entitled **"IMPROVEMENTS IN OR RELATING TO PHENOL-ALDEHYDE CONDENSATION PRODUCTS,"** offers same for licence or otherwise to ensure practical working in Great Britain. Inquiries to Singer, Stern & Carlberg, 14 E. Jackson Boulevard, Chicago, Illinois, U.S.A.

AUCTIONEERS, VALUERS, Etc.

EDWARD RUSHTON, SON AND KENYON
(Established 1855).

Auctioneers, Valuers and Fire Loss Assessors of
CHEMICAL WORKS PLANT AND MACHINERY
York House, 12 York Street Manchester.

Telephone 1937 (2 lines) Central Manchester.

WANTED

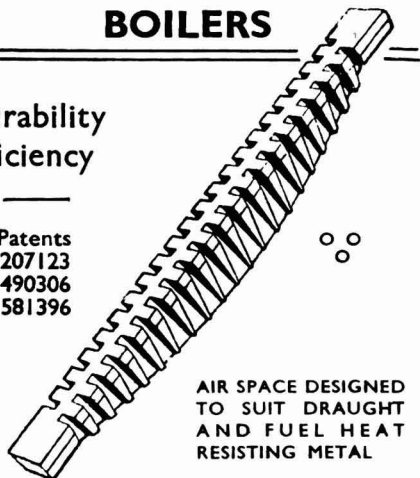
INDUSTRIAL BY-PRODUCTS, LTD., 16, Philpot Lane, London, E.C.3, will be pleased to receive particulars of any by-products, waste materials and residues for disposal.

PROCESS SALVAGE, LTD., offer the highest prices obtainable in this country for 40/45-gallon bung type and full aperture **STEEL DRUMS**. We are interested in purchasing any quantities of either type you may have available for disposal and can arrange for cash payments and immediate collections.— Please ring Advance 1676 (four lines) or write **PURCHASING DEPARTMENT, PROCESS SALVAGE, LTD., 79/83 COBORN RD., BOW, LONDON, E.3.**

FOR ALL TYPES OF BOILERS

Durability
Efficiency

Patents
207123
490306
581396



AIR SPACE DESIGNED
TO SUIT DRAUGHT
AND FUEL HEAT
RESISTING METAL

COLLINS IMPROVED FIREBARS, LTD.

51, THE MALL, EALING, LONDON, W.5
T N. Ealing 4070

KEEBUSH

Keeshush is an acid-resisting constructional material used for the construction of tanks, pumps, pipes, valves, fans, etc. It is completely inert to most commercial acids; is unaffected by temperatures up to 130°C; possesses a relatively high mechanical strength, and is unaffected by thermal shock. It is being used in most industries where acids are also being used. Write for particulars to—

KESTNER'S

5 Grosvenor Gardens, London, S.W.1

Whate'er you wish
to sieve or strain
A finer product
to obtain;
A process that you
wish to hustle
Send a postcard
on to Russell

Write today for fully
illustrated literature and
details of 28 days
Free Trial.

RUSSELL CONSTRUCTIONS LTD
Russell House,
9 Adam St., Adelphi,
LONDON, W.C.2
Phone: Temple Bar 0055-9 and 9815.
Grams: Russelcon, Rand, London.

RUSSELL

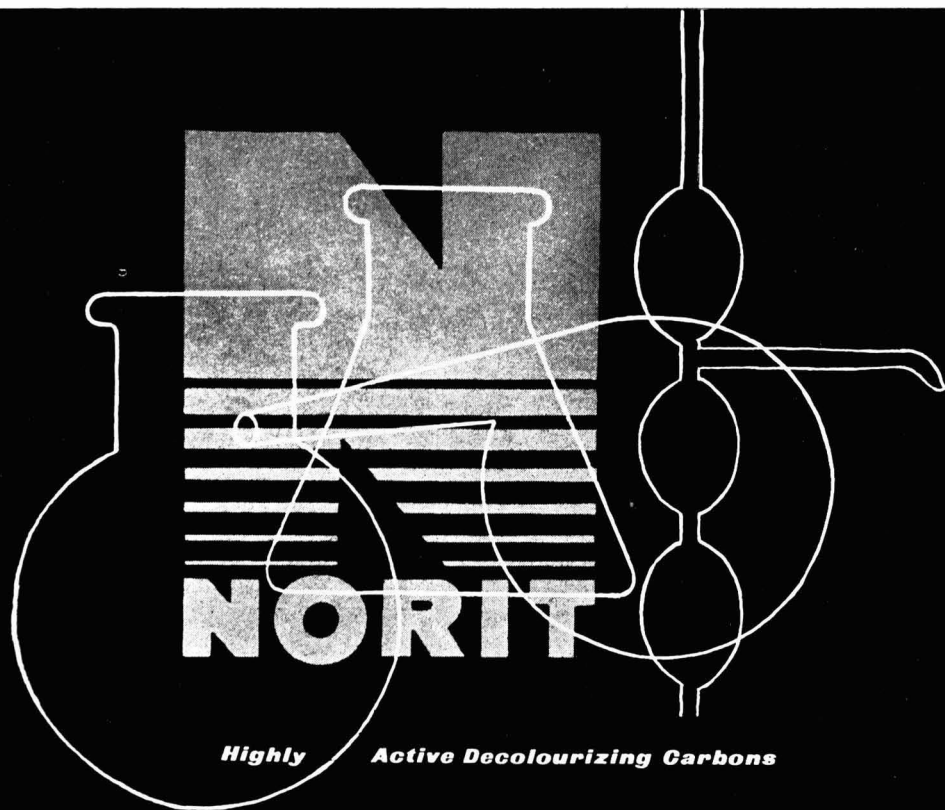


7256

Sales & Service... RECONDITIONED DRUMS

S. GIRLING & SONS (COOPERS) LTD.

59 Lea Bridge Road London E.10 Tel: LEY 3852-1735



Highly Active Decolourizing Carbons

Decolourization and Purification
of organic and inorganic chemicals for industrial
and pharmaceutical purposes. Special granular grades for solvent
recovery, separation of gas mixtures and distillates,
or to act as a catalyst-carrier.

United Norit Sales Corporation Ltd., Amsterdam

Representation in United Kingdom:

Haller & Phillips Ltd - London E.C.2.
14, Wool Exchange-Basinghall Street
Telephone: MONarch 9041/2

INDEX to advertisers in this issue

	Page		Page
Airguard Ltd.	987	Measuring & Scientific Equipment Ltd.	982
Benjamin Electric Ltd.	979	Meigh Castings Ltd.	987
Beryllium & Copper Alloys Ltd.	988	Metropolitan-Vickers Electrical Co., Ltd. Cover iv	
British Drug Houses Ltd. (The)	Front Cover	Mond Nickel Co., Ltd. (The)	981
		Moritz Chemical Engineering Co., Ltd.	984
Classified Advertisements	1026, 1027, 1028	National Enamels Ltd.	Cover ii
Collins Improved Firebars Ltd.	1028	National Industrial Fuel Efficiency Service	980
		Nu-Swift	986
Ferris, J. & E., Ltd.	986	Panorama Equipment Ltd.	985
Girling, S., & Sons (Coopers) Ltd.	1028	Pascall Engineering Co., Ltd. (The)	1025
Haller & Phillips Ltd.	1029	Permutit Co., Ltd. (The)	1023
		Prodorite Ltd.	987
Kestner Evaporator & Engineering Co., Ltd.		Pulsometer Engineering Co., Ltd. (The)	990
	986, 1028	Russell Constructions	1028
Key Engineering Co., Ltd. (The)	Cover ii	Staveley Iron & Chemical Co., Ltd. (The)	982
Leda Chemicals Ltd.	983	Wallach Bros. Ltd.	986
Lennox Foundry Co., Ltd.	1030	Walley, A. L.	990
Lord, John L.	Cover iv	Wells, A.C., & Co., Ltd.	Cover ii
Manlove Alliott & Co., Ltd.	Cover iii	Zeal, G. H., Ltd.	1025

POSITIVE ROTARY

BLOWERS

AND LOW PRESSURE EXHAUSTERS



for outputs
from 2 to 30
cu. ft. p.m.
pressures up
to 5lbs. sq.in.

Small Rotary Blowers are essential for many industrial purposes where a steady flow of air is required. A Blower to handle corrosive gases is now being developed.



LENNOX FOUNDRY CO., LTD.

Tantiron Foundry, Glenville Grove, London, S.E.8

Manlove's

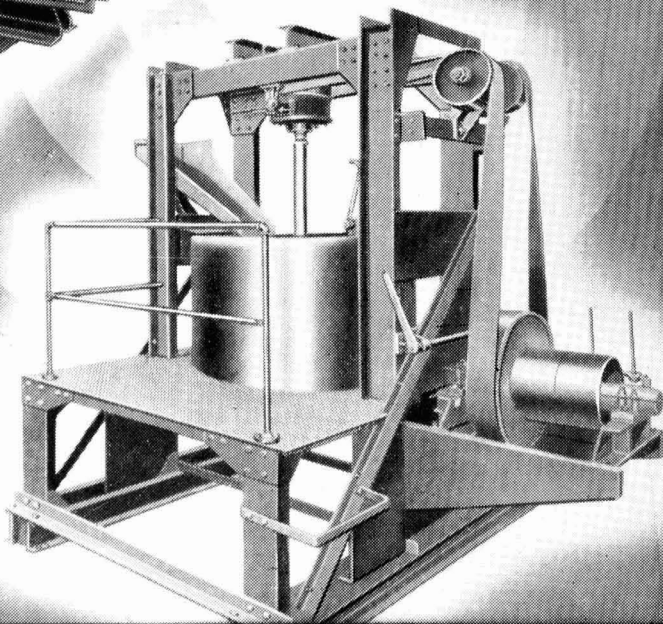
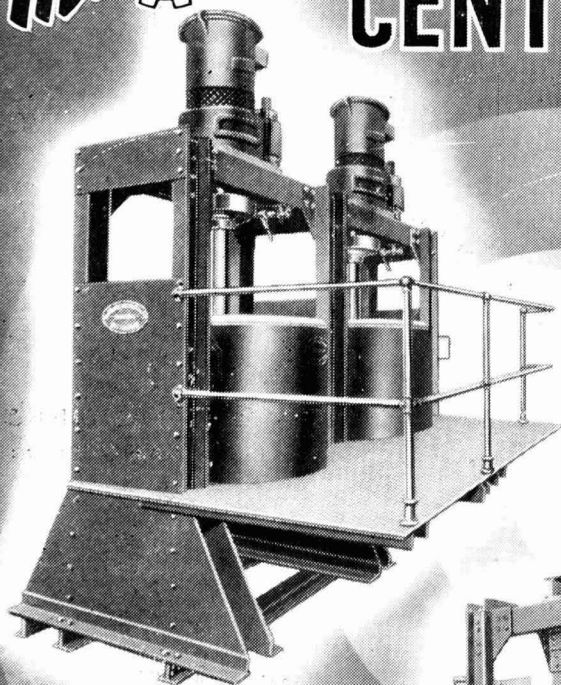
CENTRIFUGALS

"WESTON" Type Centrifugals

Available in single units or in Batteries.
Self-contained, electrically or belt
driven.

Baskets arranged for bottom discharge.
Special feed arrangements if desired.
Baskets and casings of non-corrosive
materials.

Structures to suit any requirement
Speed to suit requirements of product.
Sizes from 30 in. to 48 in. dia.
Early delivery.



MANLOVE, ALLIOTT & CO. LTD.

BLOOMSGROVE WORKS · NOTTINGHAM

TEL: NOTTINGHAM
75127 (3 lines)

LONDON OFFICE · 41 & 42 PARLIAMENT STREET · WESTMINSTER S.W.1

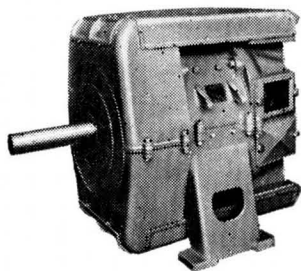
TELEGRAMS:

MANLOVES, NOTTM

TELEPHONE: WHITEHALL 5931-2

"STILL LEADING"**For CHEMICAL & ALLIED TRADES****ACID RESISTING
CEMENTS & LININGS****For PICKLING TANKS, FLOORS,
DIGESTERS, KIERS,
STONE, CONCRETE,
BRICK, WOOD,
IRON VESSELS
& ACID
TOWERS****RESISTS**

Formaldehyde,
Alcohol, Oils, Greases
and Tar Acids, Benzene
Toluene Compounds HCl
 H_2SO_4 , HNO_3 , and H_3PO_4 ,
mixed HNO_3 and HF Acids,
Aqua Regia, Formic, Acetic, Lactic
Oxalic, Chromic Acids, Bisulphites,
Hypochlorites, Mixed Acids, Peroxides,
Nascent Halogens and Alkalies.

UNDER STEAM PRESSURES**SOLE MAKER OVER 50 YEARS' EXPERIENCE****RIZISTAL****JOHN L. LORD****WELLINGTON CEMENT WORKS**TELEGRAMS: CEMENT
PHONE: BURY 612**BURY, LANCASHIRE****No admittance...**

...to dirt and dust,
acid splashes,
corrosive fumes in
gas works, boiler houses
and coke oven plants

...When you employ
Metrovick TECAC Motors

The illustration shows a
Metrovick TECAC direct-
current motor with in-
tegral fan-operated air
cooling circuits.



Member of the A.E.I. group of companies

J/C001