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POURING APPARATUS FOR FILTERING OPERATIONS

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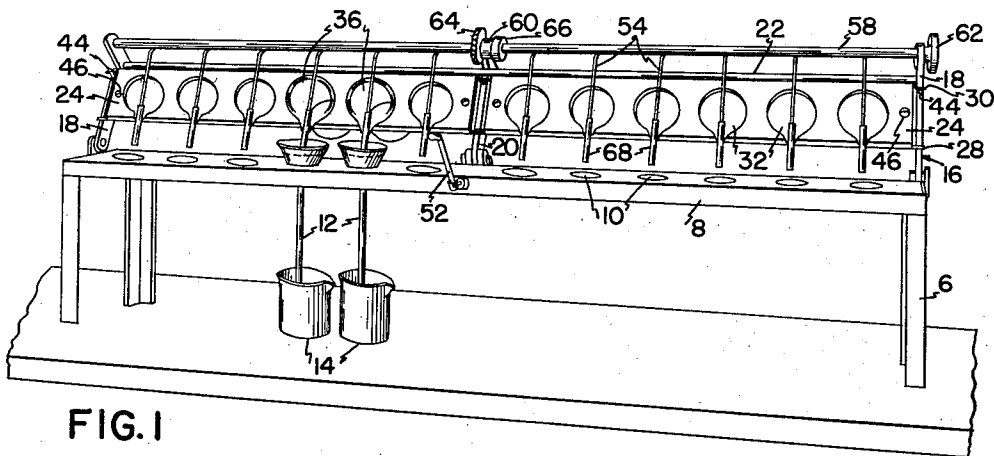


FIG. 1

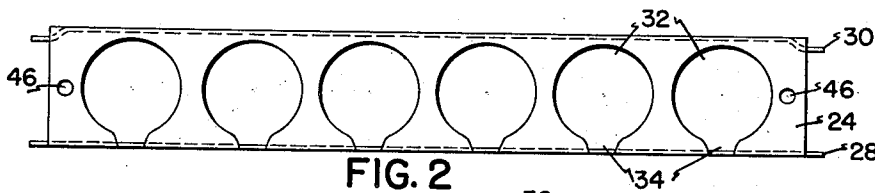


FIG. 2

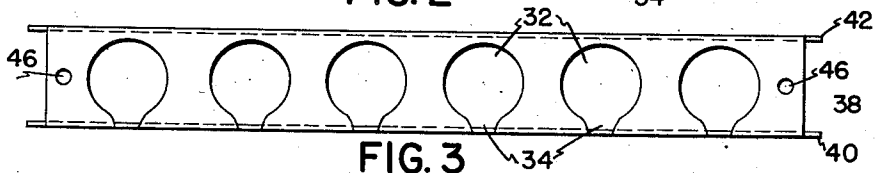


FIG. 3

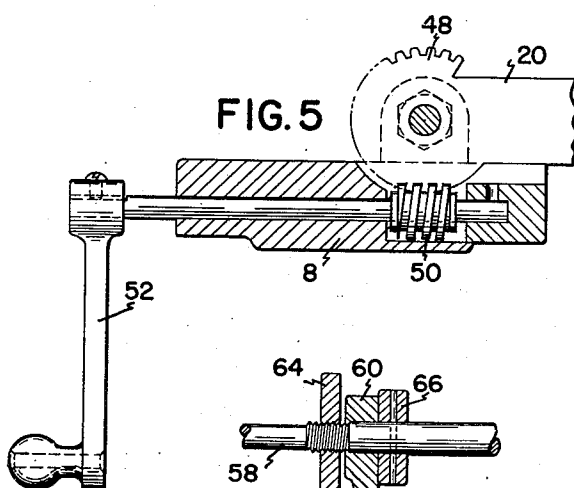


FIG. 5

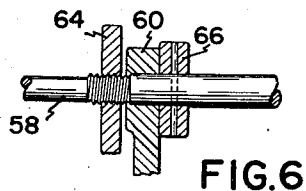


FIG. 6

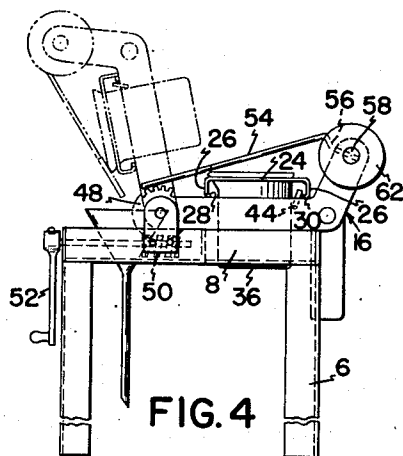


FIG. 4

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POURING APPARATUS FOR FILTERING OPERATIONS

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3 Claims. (Cl. 23—259)

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The present invention relates to pouring apparatus, and more particularly to apparatus useful in the chemical or metallurgical laboratory to handle gang operations in pouring liquids, as for example in the filtering of liquids in chemical analyses.

In analyses and assays for chemical and metallurgical purposes it is necessary to pour and filter liquids many times. This is usually accomplished by placing the funnels in a funnel rack, and manually pouring the liquids out of beakers into the funnels one at a time. The work is exceedingly laborious when a large number of liquids need to be handled. Furthermore there is the danger of spillage at each operation. So far as we are aware no satisfactory method or apparatus has previously been devised for gang operations with liquids for such purposes.

The principal object of the present invention is to provide a simple and inexpensive apparatus for convenient gang pouring of liquids, particularly for purposes of filtering. To this end and with other objects in view as will hereinafter appear, the invention comprises the apparatus hereinafter described and particularly defined in the claims.

In the accompanying drawings Fig. 1 is a perspective view of the preferred apparatus according to the present invention; Fig. 2 is a plan view of one form of beaker tray; Fig. 3 is a view similar to Fig. 2 but showing a beaker tray to accommodate smaller beakers; Fig. 4 is an end elevation showing the operation of the beaker frame; Fig. 5 is a detail view showing the means for effecting the tilting operation, and Fig. 6 is a detail view of the frame locking means.

The illustrated embodiment of the invention comprises a stand 6 having a funnel rack 8 of conventional form, this rack being provided with a plurality of openings 10 to accommodate funnels in the usual manner. For purposes of illustration two funnels 12 capable of discharging into beakers 14 are shown in Fig. 1.

Arranged in back of the filter rack 8 is a tiltable frame 16. This frame comprises L-shaped end brackets 18 and a center bracket 20, all rigidly secured together by a back rod or strut 22. The frame is adapted to carry beaker holders or trays, two of which are illustrated at 24 in Fig. 1.

The shape of each tray 24 is indicated in Fig. 2. The tray comprises a plate of sheet metal bent as indicated in Fig. 4 to form front and rear walls 26, the edges being reinforced by rods or wires 28 and 30. The plate 24 and the front wall thereof are provided with suitable openings of a

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shape and size to receive the beakers. Each opening has a circular portion 32 communicating with a front opening 34 which accommodates the lip of the beaker. The beakers are received in the trays as indicated at 36 in Fig. 1, two beakers being there shown as mounted in the tray. The openings 32 are spaced similarly to the openings 10 in the funnel rack. A similar tray is shown at 38 in Fig. 3 for smaller beakers. The tray 38 is provided with reinforcing rods or wires shown at 40 for the front and 42 for the rear. It will be noted that the rear rod 30 of the large tray 24 is curved forwardly at its ends. Thus, the spacing between the ends of the rods 28 and 30 of the large tray 24 is the same as the spacing between rods 40 and 42 of the small tray 38. In either case the front rod 28 or 40 rests on one of the L-shaped end brackets 18 and the center bracket 20 while the rear rod, whether 30 or 42, likewise rests on the same brackets and is retained by pins 44 extending upwardly from the brackets. In view of the uniform spacing of the ends of the rods, the front wall of the tray, and hence the lips of the beakers, will be in the same position relative to the funnels, irrespective of the size of the beakers.

The beaker trays are provided with suitable means for lifting and carrying them. As shown in Figs. 2 and 3, suitable holes 46 are provided at opposite ends of the tray to receive carrying hooks or tongs.

The frame 16 may be tilted from the full line position of Fig. 4 in which the beaker trays are substantially horizontal to an angle of somewhat greater than 90° to the dot-and-dash line position of the same figure. To this end the center bracket 20 is formed at its forward end with a gear segment 48, which meshes with a worm 50 journaled in the center of the funnel rack 8 and arranged to be turned by handle 52.

Extending over each opening in the beaker trays is a pouring and retaining rod, the several rods being indicated at 54. The ends of the rods at the rear are bent as indicated at 56 in Fig. 4 to be received in a long shaft 58 which is journaled at its ends in the two L-shaped brackets 18. At the center the shaft is journaled in a bearing 60 in the top of the L-shaped center bracket 20. The shaft is provided at one end with a hand knob 62 whereby the entire gang of pouring rods 54 may be turned from the position shown in Fig. 4 to an upright position so that the beaker trays can be inserted or removed. To provide for locking the rods in one position or the other, a knurled wheel 64 is threaded on

the shaft 58 immediately adjacent to the bearing 60, and a disk 66 is secured to the shaft 58 on the opposite side of the bearing from the wheel 64 as indicated in Fig. 6. By tightening the wheel 64 against the bearing the shaft is caused to bind so that the rods 54 are locked in position.

The pouring rods 54 may be provided with rubber sleeves 68 shown in Fig. 1, as is common in this art.

As shown in Fig. 4, the pouring rods when in beaker-retaining position are arranged at an angle with respect to the trays so that the edge of each pouring rod contacts the lip of the beaker and extends forwardly over the beaker to a point above the funnel. The axis of rotation of the tiltable frame is slightly above and back of the funnel holes 10, to maintain the end of the pouring rod always over the funnel, as indicated in Fig. 4.

In operation the tiltable frame 16 is set in horizontal position and the pouring rods 54 are swung out of the way. A tray 24 or 38 containing any desired number of beakers is then laid on the frame with the rear pins 30 (or 42) against the pins 44 on the L-shaped brackets. It will be understood that a corresponding number of funnels 12 will be set in the rack 8 and these funnels may be provided with filter paper if filtering operations are to be performed. The shaft 58 is then turned into the position shown in full lines in Fig. 4 whereby the pouring rods 54 engage the lips of such beakers as are in position. The shaft 58 is then locked by the wheel 64. The frame is then tilted to such a position that liquid runs from the beakers into the funnels. As the liquids run out of the beakers the frame is tilted by giving an occasional turn to the handle 52. It will be understood that the rate at which the frame is tilted will be determined by the rate at which the slowest filter can accommodate its liquid. Since the beakers are handled without agitation and are moved smoothly from one position to another, any sediment in the beakers is not stirred up. The liquid is in effect decanted from the sediment, thus diminishing the work called upon to be performed by the filters. Ultimately the entire frame is tipped up through an angle of somewhat greater than 90° as indicated by the dot-and-dash lines of Fig. 4 in order to drain all of the liquid from the beakers. The frame is then restored to its original horizontal position and the gang pouring rods are released and turned up to the position which will permit removal of the beaker trays.

As heretofore noted, the trays may be most easily removed by suitable hooks or tongs passed through the openings 46. This arrangement is particularly satisfactory in that the entire tray of beakers may be carried to, say, a hot plate for heating if such operation is called for by the analysis. The tray may be simply set on the plate. After the heating operation the tray may be lifted to transport the beakers to the filter.

Having thus described our invention, we claim:

1. Pouring apparatus comprising a funnel rack having openings to receive funnels, a tiltable frame having provision for holding beakers in alignment with the several openings of the funnel rack, means for tilting the frame to turn the beakers into pouring position, a plurality of pouring and retaining rods to align with the lips of the individual beakers, a single rod-supporting member on which all of the rods are mounted

at their ends, said rod-supporting member extending across the frame above and in back of the beakers so that the rods extend downwardly and forwardly to engage only the lip portions of the beakers, manual means for rotating the rod-supporting member independently of the tiltable frame to cause gang-swinging of the rods toward or away from engagement with the beakers, and a locking device for the rod-supporting member to hold the rods in beaker-retaining position, the rods and rod-supporting member being movable with the frame when the frame is tilted, whereby the relationship of any rod with respect to a beaker is maintained throughout the tilting movement.

2. Pouring apparatus comprising a funnel rack having openings to receive funnels, a tiltable frame, a removable beaker tray having beaker-receiving openings to align with the openings of the funnel rack and having means to position the tray on the frame, means for tilting the frame to turn the beakers into pouring position, a plurality of pouring and retaining rods to align with the lips of the individual beakers mounted in the tray, a single rod-supporting member on which all of the rods are mounted at their ends, said rod supporting member extending in back of the beakers, the rods being arranged to extend downwardly and forwardly to engage the lips of the beakers to hold the beakers in the tray and to hold the tray on the frame, a locking device for the rod-supporting member to hold the rods in beaker retaining position, and a manual device operable independently of the frame for turning the rod-supporting member to turn the rods as a gang toward or away from the beakers.

3. Pouring apparatus comprising a funnel rack having openings to receive funnels, a tiltable frame, a removable beaker tray having beaker-receiving openings to align with the openings of the funnel rack, the frame having end brackets, the tray having supporting rods to rest on the end brackets and the brackets having positioning means to engage the rods, gearing to tilt the frame to bring the beakers into pouring position, a shaft extending between the side brackets above and in back of the frame, a gang of pouring and retaining rods mounted in the shaft to engage the lips of the individual beakers and arranged to maintain a fixed relationship with respect to the beakers during a tilting movement of the frame, and manual means operable independently of the tilting movement of the frame for turning the shaft to swing the rods as a gang into or out of engagement with the beakers.

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