INK PUMPS FOR PRINTING PRESSES

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This invention relates to ink pumps for printing presses, and more particularly to such pumps adapted to use in multicolor presses or in applications where the quantity and color of ink used is subject to considerable variation.

One object of the invention is to facilitate cleaning, particularly where the color of ink used is being changed.

Another object of the invention is to facilitate change of pumping speed and rate at which the ink is delivered, and to accomplish this with maximum efficiency.

A pump embodying the invention in a preferred form will now be described with reference to the accompanying drawing, and the features forming the invention will then be pointed out in the appended claims.

In the drawing:

Fig. 1 is a plan view, partly broken away, of a pump embodying the invention in a preferred form.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a section similar to Fig. 2 but showing a modification of the invention;

Fig. 4 is a fragmentary sectional view, showing a part of Fig. 2 with modification of certain of the parts thereof.

Fig. 5 is a section on a somewhat enlarged scale, corresponding also to a part of Fig. 2 and showing certain modifications therein; and

Fig. 6 is a detail showing a coupling element in the device of Fig. 3.

The pumps with which the present invention is concerned are of a generally familiar type, such as shown in prior White Patent 1,311,198 and Schmidt Patent 1,348,900, and characterized by the provision of an individual pump plunger or piston for each column or other unit width of the product produced or printing cylinder or cylinders which print it, and by the grouping of these plungers or pistons in banks corresponding to a page width or other larger subdivision of product and cylinder.

The pump shown in Figs. 1 and 2 comprises a general housing 10 affixed to a bottom 11 in which openings 12 are provided for the conduits leading to the ink rail and supplying the individual columns. An adjustable port plate 13 is slidably supported in the bottom 11 and may be adjusted to cut off the supply of ink to a page by means of an operating shaft 14. The details of this part of the structure are shown and described in prior Worthington et al. application Serial No. 446,212, filed July 28, 1954 for Page Cut-Off for Inking Mechanism and will not be further described herein.

A cylinder plate 15 receives the plungers or pistons 16 in cylinder boxes as shown. The plungers are reciprocated by an operating member 17 thrusting against collars 18 on the pistons, and the pistons are urged upwardly by means of springs 19, as indicated. The upward stroke of any piston may be limited by means of an adjusting screw 20 abutting against its end, in the usual way.

The operating member or plate 17 is reciprocated vertically and horizontally (at right angles to the plane of Fig. 2) by means of an eccentric 21 driven by a gear 22, which in turn, is driven by a gear 23, as indicated. The operating plate 17, its eccentrics and drive gearing, as well as the adjusting screws 20 are all mounted in a cover or upper element 25 forming part of the housing, the blocks 24 being removable attached thereto by bolts 26. The cover plate 25 is, in turn, secured in place to the housing walls 10 by bolts 27.

A dust cover 30 is mounted by means of hinges 31 on the upper housing element 25, and the element 25 is further provided with an ink filling opening covered by a pivoted cover plate 32.

The pump internal drive shaft 33 (Fig. 2) upon which gear 23 is mounted, is provided at one end with a square socket 34 receiving and fitting the squared end 35 of drive shaft 36 which passes through a supporting and sealing bushing 37 supported in a boss 38 on an external gear housing 29 affixed to housing wall 10, as shown.

When it is desired to clean the pump, shaft 36 is pulled outwardly, in a manner later described, so as to clear shaft 33. Bolts 27 may then be removed and the entire structure, with the exception of the cylinder plate 15 and subadjacent elements, may be removed. As will be noted in Fig. 2, the plate 15 is held in position and guided by gib 40, which, in turn, are removably secured to the housing bottom by bolts or screws 41, so that this element also may be removed although this is ordinarily not necessary. Cylinder plate 15 is connected to operating plate 17 by pins 42 secured to the plate 15 and reciprocable in bores in the plate 17, as indicated.

The upper ends of the pins 42 are tapered or rounded, as shown, to facilitate reinsertion of the removable elements.

The drive for shaft 36 is similar to that shown in prior Lamatch Patent 2,444,656, in which it includes a housing and associated elements which may be turned through 180° about the axis of the shaft for the purpose of reversing the direction of drive of the ink pump with reference to a unit with which it is associated. However, in the present structure, means is provided for also moving the housing and associated elements axially of the said shaft, to permit removal of the pumping elements as just mentioned and for further varying the drive ratio in a very simple manner.

The boss 28, previously mentioned, is formed on an inner or main gear housing element 39, in which there is journaled a cross shaft 51 having a clutch coupling element 52 at each end for cooperating with a corresponding clutch element on a press driven shaft (not shown). A bevel gear 53 fixed to the end of shaft 36 meshes with a bevel gear 54 fixed to a spur gear wheel 55 and rotatable therewith on the shaft 51. A similar spur gear 56 fixed to the shaft 51 takes the axial thrust of the bevel gear 54 through the gear wheel 55 to which it is attached.

An outer gear housing element 60 supports an axially movable shaft 61 upon which are rotatably mounted a coupling gear 62, and an intermediate drive gear 63 which is adapted to mesh with a further drive gear 64 fixed to the shaft 61. A spring detent 65 cooperating with notches 66, 67 in the shaft 61 and a guide pin 680, fitting a groove 69 in the shaft 61 serve to hold this shaft from turning and to hold it either of two axial positions, as indicated in the drawing. In the first axial position, which is that of Fig. 2, gear pair 63, 64 are out of mesh and, hence, inoperative, while gear 62 which is twice the width of gears 65 and 56 is in mesh with both these gears, serving to couple them together in 1-1...
driving relation and thus to form a driving connection between shaft 51 and bevel gear 54. It will be noted that gear 62 is smaller in diameter than gear 64, and typically in a ratio of about 4:7, so that if the shaft 61 is slid to its other position, bringing gear 62 out of mesh with gear 56 and gears 63 and 64 into mesh, a correspondingly reduced drive speed ratio between shaft 51 and bevel gear 54 will be provided, the drive in this case being from shaft 51 through gear pair 64, 63 to shaft 61 and thence through gear pair 62, 55 to the bevel gear 54.

In Fig. 5, the shaft 61 is shown in its other position, and the gears 63 and 64 are shown as transposed between the two shafts 51, 61, so that the smaller gear 63 is on the shaft 51 and the larger gear 64 is on the shaft 61, in this case the operation will be the same, except that there will be an increase of speed as between shaft 51 and bevel gear 53.

Gear housing elements 39, 60 are secured together by bolts 70 at two opposite corners, and bolts 71 pass through both elements 39 and 60 at the two opposite corners and engage in threaded bores or sockets 72 in the ink pump housing wall 10, as indicated in Fig. 1.

The drive arrangement just described and involving gear housing 56 and associated elements, forms in itself no part of the present invention and is discussed more fully and claimed in Willoughby and Worthington application Serial No. 523,457, filed July 21, 1955 for Ink Pumps for Printing Presses.

The present application is concerned more particularly with the provision for convenient cleaning and change in color of the ink used. It will be observed that by loosening bolts 71, the housing 39, 60 may be pulled out axially, to a point where the shaft end 35 is out of socket 34, thus permitting vertical removal of the internal pump elements. Loosening the hold of the bolts 27 which retain the cover and supporting member 25 in position, permits the withdrawal of the entire pumping mechanism apart from the cylinder plate 15, as a unit. It will be apparent that the pump and reservoir may now be cleaned very readily and the ink changed very quickly. The reassembly involves no difficulty, as it is necessary only to locate the tapered pins 42 with the bores and plates 17 which receive them and then to lower the cover 25 and attached parts into position. Shaft end 35 may now be reinserted in socket 34 and bolts 27 tightened up, putting the pump again in condition for operation.

What is claimed is:

1. In a printing machine ink pump, and in combination, an ink reservoir and pumping unit comprising a housing having ink passages formed in the bottom thereof, a cylinder plate having cylinder bores adapted to register with the said apertures for discharging ink therethrough, guides radially mounting the cylinder plate in the reservoir for movement between an ink intake position and an ink discharge position, a supporting structure, pistons adapted to reciprocate in the said bores, means reciprocably mounting the said pistons on the said supporting structure, means for reciprocating the said pistons, also mounted on the said structure, and means removably mounting the said supporting structure in the reservoir, the said supporting structure having bores parallel to the cylinder bores and the cylinder plate having locating pins slidably received in the last said bores.

2. In a printing machine ink pump, and in combination, an ink reservoir and pumping unit comprising a housing having ink passages formed in the bottom thereof, a cylinder plate having cylinder bores adapted to register with the said apertures for discharging ink therethrough, guides radially mounting the cylinder plate in the reservoir for movement between an ink intake position and an ink discharge position, a supporting structure, pistons adapted to reciprocate in the said bores, means reciprocably mounting the said pistons on the said supporting structure, means for reciprocating the said pistons, also mounted on the said structure and comprising a centrally located drive gear, driven gears to each side thereof and piston reciprocating eccentrics driven by the said driven gears, and means removably mounting the said supporting structure in the reservoir, the said supporting structure having bores parallel to the cylinder bores and the cylinder plate having locating pins slidably received in the last said bores.

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