April 2, 1963 T. P. O'HARE 3,083,635

BOLSTER ASSEMBLY FOR PRESSES

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FIG. 1

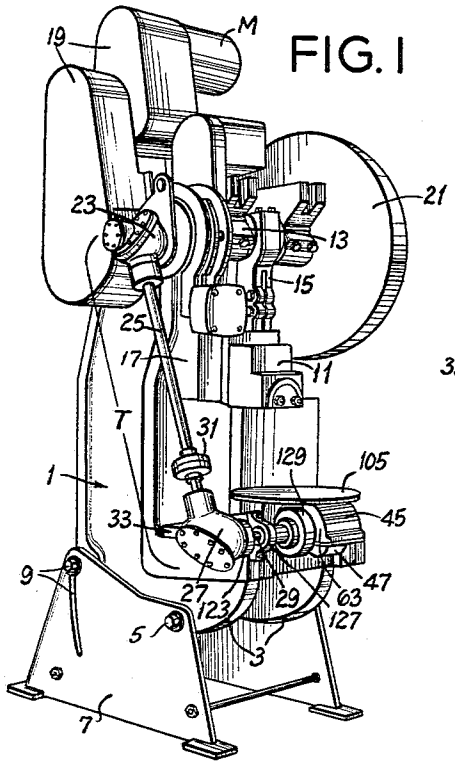


FIG. 2

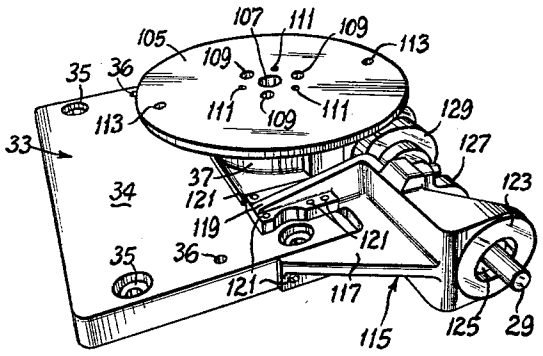
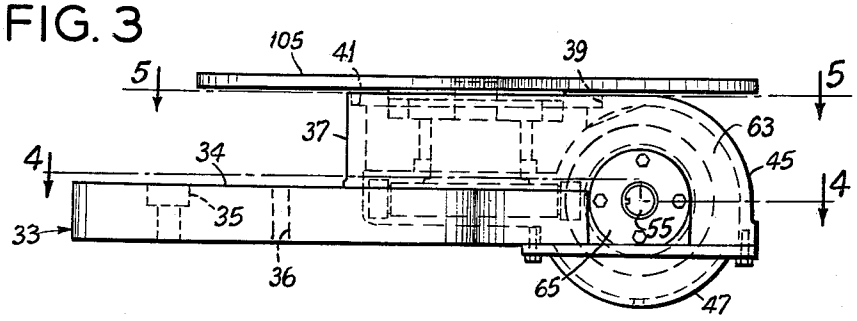


FIG. 3



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FIG. 4

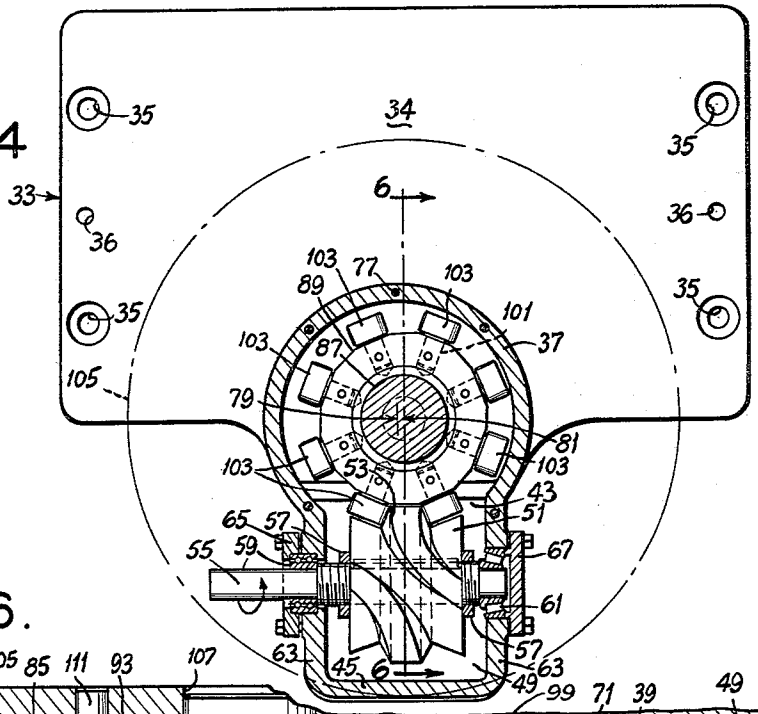


FIG. 6.

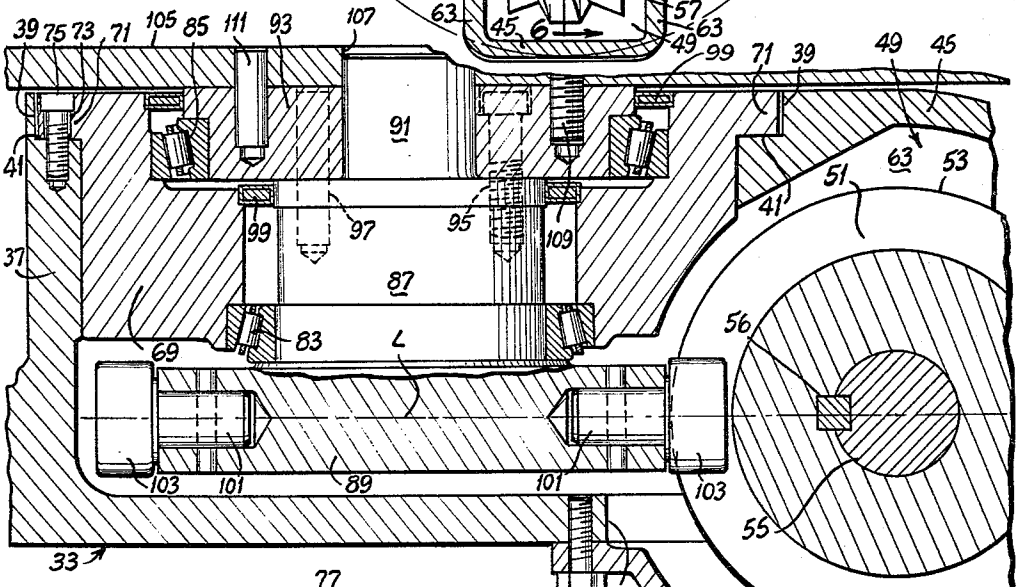
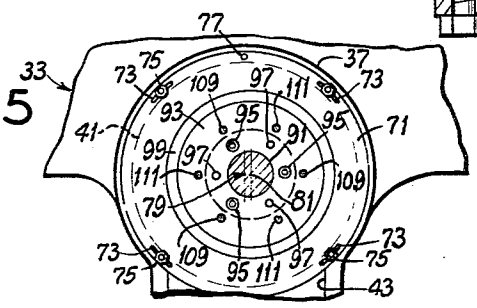


FIG. 5



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BOLSTER ASSEMBLY FOR PRESSES

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This invention relates to bolster assemblies for presses, and with regard to certain more specific features, to a unitary indexing bolster assembly for presses of various types.

Among the several objects of the invention may be noted the provision of a compact work-indexing bolster assembly for use on various presses; the provision of a unitary assembly of the class described which may have fixtures preassembled thereon at a convenient toolmaker's work station or bench preparatory to location in a press and which assembly, upon removal from the press, may be preserved in assembled condition for convenient re-use at a later time; the provision of an assembly of the class described which has interchangeable indexing dial means; the provision in a bolster of the class described of a cam type of intermittent drive for the dial means, said drive having replaceable cam follower means, the latter being adapted to be initially permanently adjusted for minimum backlash between the cam and the follower; and the provision of an indexing bolster assembly which carries its own lubricating system for its cam and follower system. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structure hereinafter described, and the scope of which will be indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

FIG. 1 is a perspective view showing the invention in general as applied to a mechanical press;

FIG. 2 is a perspective view showing the invention with certain auxiliary left-hand drive attachments connected therewith, making it adaptable to the press shown in FIG. 1 which has a left-hand take-off drive;

FIG. 3 is an end elevation of FIG. 2, shown orthographically and with said auxiliary drive attachment removed therefrom, this view also being from the left of FIG. 4;

FIG. 4 is a plan view, partially in section, being taken on line 4—4 of FIG. 3 but rotated through 90° clockwise;

FIG. 5 is a cross section taken on line 5—5 of FIG. 3; and

FIG. 6 is an enlarged cross section taken on line 6—6 of FIG. 4, parts being broken away.

Corresponding reference characters indicate corresponding parts throughout the several views of the drawings.

Presses for working metals and the like, whether mechanical, hydraulic or of other types, usually require a bolster which is attached to the bed of the press. Bolsters are for the purpose of forming accurate supporting surfaces for various fixtures such as subpresses, dies and the like with which the press rams cooperate. It is desirable in many press operations automatically to feed the work and this may, for example, be accomplished by means of an intermittently driven indexing means. Heretofore it has been the practice to support such indexing feed means extraneously with respect to the bolster. Consequently, the organizational set-up between the apparatus carried on the bolster and the intermittent feed apparatus needed to be accomplished at end in the press, which is in general an undesirable place for such work requiring

high precision. Moreover, at the end of a press run, the required disassembly heretofore destroyed the organizational set-up between the bolster and the intermittent feed means. Hence the set-up work needed to be repeated wastefuly for any subsequent press run.

By means of the present invention, a cam-driven indexing dial feed means is permanently and integrally organized with a bolster for application to the bed of the press. This permits of convenient bench operations, at a location away from the press, for placing dies, subpresses and the like on the bolster, the same being properly organized with respect to the intermittently movable dial. A setup, once made, may be conveniently moved to the press for attachment as a unit and without disassembly of the properly organized parts. In the case of mechanical presses, the conventional drive take-off on the crankshaft of the press may be used as driving means. In the case of hydraulic and like presses, the drive for the drive feed means may be hydraulically, electrically or otherwise interlocked with the press motion.

Referring now more particularly to the drawings, there is shown by way of example in FIG. 1 a mechanical press 1 having a bed 3 pivoted at 5 to a base 7, adapted to be located in any desired angled upright position by means of bolt and slot combinations, one of which appears at 9. The ram of the press is shown at 11, connected with its crankshaft 13 by means of a connecting rod 15. The ram 11 slides in guides, one of which is shown at 17. The covered main press drive is indicated in general at 19, a driving motor being indicated at M. Covered flywheel portions of the press are shown at 21. At T is shown a conventional auxiliary take-off drive from the crankshaft 13, consisting of a bevel gear box 23 driven by crankshaft 13. Bevel gear box 23 is connected by an intermediate countershaft 25 with a bevel gear box 27. Box 27 is connected with a shaft 29 forming a drive connection for driving the bolster assembly shown in FIGS. 2–6, the latter forming the subject of the invention. In the countershaft 25 is a flexible coupling 31, which allows for deflection of the press frame without placing any substantial strains on the gear boxes 23 and 27. The coupling may also be used to adjust the angular relationship between the shaft 29 and crankshaft 13.

Referring now to FIGS. 2–6, there is shown at 33 a bolster plate adapted by means of four holes 35 therein to be bolted to the press bed 3. This plate has a top area 34 which is prepared by flat or other machining for accurate mounting of appropriate fixtures, with respect to which the ram 11 is to operate, such as dies, subpresses and the like. Holes 36 therein are for the purpose of receiving locating dowels to position the bolster with respect to the bed 3. Extending upward adjacent what will be referred to as the forward side of the bolster plate 33 is a cup-shaped housing 37. The cup 37 has a top opening, as indicated at 39, beneath which is a shoulder 41. The cup is open at the front side, as indicated at 43. From the top of the opening 43 there extends a portion providing a cover 45 having enclosing end walls 63. The bolster 33, cup 37, cover 45 and walls 63 are integral. The space provided within cover 45 and walls 63 is open at the bottom but covered by a liquid-tight pan 47 and serves as a sump for holding oil or lubricant up to the level shown at L. The space 49 within cover 45, end walls 63 and pan 47 is adapted for the reception of a barrel-shaped ridge cam 51, the ridge of which is shown at 53. The cam is keyed to a drive shaft 55, the latter being threaded for the reception of holding nuts 57. The key is shown at 56. The shaft 55 is supported in bearings 59 and 61, located in appropriate openings in walls 63. Numerals 65 and 67 indicate holders for bearings 59 and 61, respectively.

In the cup 37 is located a bushing 69 which has a flange

71 resting on the shoulder 41. The flange 71 is provided with peripheral slots 73, through which pass bolts 75 for holding the bushing 69 in any one of a limited number of angularly adjusted positions relative to the cup 37. After a desired adjusted position is obtained (in the manner to be described), flange 71 and shoulder 41 are drilled for the reception of a dowel pin 77. This is to provide for accurate replacement of the bushing 69 in its originally adjusted position, should its removal and replacement be required for repairs.

The center of rotation for the bushing 69 in the cup 37 is indicated at 79. The bushing 69 is step-bored around a center 81 (somewhat removed from center 79) for the reception of lower and upper anti-friction bearings 83 and 85, respectively. Mounted in the lower bearing is a hub 87 of a wheel or cam follower bushing 89. Extending upward from the hub 87 is a gudgeon 91, around which and adjacent to the hub 87 is located a flange-forming member 93. This member is attached to the hub 87 by means of socket bolts 95 and dowel pins 97. The heads of the bolts contain hexagonal sockets so that they may be drawn up, leaving their upper surfaces below the upper surface of the flange member 93. Oil sealing rings are indicated at 99.

In view of the above, it will be seen that there is an eccentricity between the center of rotation of assembly (87, 89, 91, 93) and the center of rotation of the supporting bushing 69 for this assembly. Therefore, the center of rotation 81 may be moved around center 79, so as to move the wheel 89 to the right or left from its position shown in FIG. 6; or up and down from its position shown in FIG. 5. This is accomplished by rotating the bushing 69 in cup 37 when initial assembly is made and the dowel pin 77 set. Thereafter, if it becomes necessary to remove the assembly (69, 87, 89, 91, 93) for repairs, it may be conveniently returned to its original position upon reassembly in the cup 37.

Pinned to the periphery of the bushing wheel 89 are studs 101 which carry rollers 103. These, by pairs, engage opposite angled straight sides of the ridge 53. The adjustment above described permits accurate engagement between the cylindrical sides of the rollers 103 and the straight sides of the ridge 53 so as to obtain minimum backlash. By straight sides on ridge 53 is meant that any section of the ridge containing the axis of shaft 55 has straight-line sides, although the ridge extends in a twist around the barrel-shaped ridge cam 51. Eight rollers 103 are shown by way of example, but it may be understood that other numbers may be employed. In the example illustrated, the ridge 53 is so disposed around the barrel-shaped ridge cam 51 that in one revolution of the shaft 55, the assembly (87, 89, 91, 93) is rotated once with desired initial angular movement, intermediate dwell and final desired angular movement. Thus for eight turns of the shaft 55, eight intermittent dwells between angular advances are effected for flange 93. Other numbers of rollers and ridge form may be employed for other desired intermittent-motion functions.

At numeral 105 is shown an indexing dial plate of generally disc form which has a central hole 107, centering it on the gudgeon 91. This plate rests on the flange 93, to which it is attached by socket bolts 109 and dowels 111. It overhangs the flat area 34 of the bolster plate so that parts thereon may be brought into operating position relative to any fixture attached on surface 34. Appropriate holes 113 are indicated in the dial 105 for accepting appropriate attachments for any apparatus it is desired to carry on the dial 105. Dial plate 105 may have any appropriate shape but a desirable feature is that a part of its margin shall overhang the prepared surface 34, as illustrated in FIGS. 2 and 3.

At numeral 115 is shown an auxiliary left-hand (for example) bracket having arms 117 and 119 for attachment to a side and top surface respectively of the bolster plate 33. Appropriate fasteners are used for the purpose, such as shown at 121. Extending from this bracket 115 is a circular lug 123 in which is an opening 125 into which extends a stub end of the bevel gear box 27 for aligning and supporting the same. It will be recalled that the shaft 29 extends from this bevel gear box 27 and therefore passes through the opening 125. This is illustrated in FIG. 2 without showing therein the bevel gear box 27. The bracket 115 carries a pillow-block type of bearing 127 for further supporting shaft 29. Shaft 29 (FIGS. 1 and 2) is connected with shaft 55 through a conventional safety slip clutch 129. This clutch may be omitted, if desired, and a direct connection made between shafts 29 and 55 by any suitable direct-connecting coupling. The purpose of the clutch is to allow slippage if, while the press is running, any jamming occurs between parts on the movable dial and a fixture on surface 34. This slippage acts as a signal that the press should be stopped, or, if desired, any slippage may be made operative on a suitable switch (not shown) adapted to open the circuit of motor M to stop the press automatically.

While the bracket 115 for making the driving connection from the press to the cam 51 is shown in FIGS. 1 and 2 as being to the left of the dial 105, it will be understood that a right-hand bracket may be supplied for attachment to the bolster 33 on the right-hand side of the dial 105. This would be to accommodate the device to any press having a right-hand power take-off. In such cases the bearings 59 and 61 are reversed in position, as is also the shaft 55. Thus the bolster, dial and cam drive assembly may be adapted for left-hand or right-hand power take-offs on presses.

From the above it will be seen that an assembly such as shown in FIG. 2 of bolster 33, dial 105 and its driving parts such as shown in FIG. 6 (with or without the bracket 115 and clutch 129) may be placed on a workbench away from any press such as shown in FIG. 1 and an operative set-up made. For example, a subpress part, die or the like, may be accurately mounted on the surface 34 such that work parts are properly fed to it by the dial 105. In general, the mounting will be made adjacent to the part of the dial 105 which overhangs surface 34. Not only may the assembly be made on the bench, but its proper operation there checked out. Then the assembly, with the attached fixtures, may be taken to the press for simple attachment of the bolster 33 to the press bed 3 and proper phasing of the positions of ram 11 and dial 105. Phasing may be accomplished in a simple manner at clutch 129 or any coupling in the drive from the crankshaft 13 to the cam 51. It will be understood that the fixture will have been so located on surface 34 that when the bolster as a whole is bolted to the press bed 3 the ram on its downstroke cooperates with the fixture adjacent to the dial 105, the surface 34 receiving the thrust and not the dial 105. The dial simply supplies and removes work parts to and from the fixture wherein they are operated upon by the ram. When the press is operated, the substantially constant angular velocity of the crankshaft is translated into intermittent motion of the dial 105 by means of the intermittent-motion drive constituted by the cam 51 and the roller-carrying wheel 89 shown in FIGS. 4 and 6 (sometimes referred to as the roller gear type). This type of intermittent drive is of particular advantage in the case of the present invention, inasmuch as the axis of rotation of the dial 105 is perpendicular to the axis of rotation of the cam 51. This permits location of the cam 51 under an overhang of dial 105 opposite to its overhang over surface 34. This provides a very compact arrangement. It is to be understood, however, that the invention contemplates equivalent intermittent drives; for example, one in which the cam 51 has a groove instead of a ridge such as 53, and the driven member such as 89 has extensions into the groove instead of rollers engaging opposite sides of the flange of a ridge. Such an equivalent would also provide the compact arrangement above referred to.

From the above, the advantages of the invention will be apparent, namely:

(1) The integral or permanently assembled arrangement between the bolster plate **33**, dial **105** and the intermittent drive therefor, whereby work and fixture set-ups may be made at a toolmaker's bench and the resulting assembly applied to and removed from the press as a unit.

(2) The ability to make the usual fine adjustments required for the set-up on the bolster plate **33** under favorable operating conditions at the workman's bench.

(3) The simplicity with which attachment may be made of the bolster dial and intermittent drive assembly to the press bed **3**, as is desired under the less favorable work conditions at that location.

(4) The fact that after a run has been made on the press, the integral assembly of the bolster **33**, dial **105**, intermittent drive and parts thereon may be removed from the press and stored for future use without any disassembly being required between the fixtures, bolster and dial. At any future time these will be ready for reattachment to any suitable press for a rerun.

(5) The fact that the bolster-dial assembly carries its own supply of lubricant for the intermittent-motion drive parts for the dial, so that its lubrication is independent of that required for the press.

(6) The fact that correction for any wear on the surfaces of the rollers **103**, requiring replacement, involves only simple operations, namely, removal of the dial **105** from the flange **93**, removal of the bolts **75**, and removal of assembly (**69**, **87**, **89**, **91**, **93**). This assembly with replaced rollers may be returned to the position shown in FIGS. 5 and 6, the dowel **77** assuring return to the initially proper angular adjustment between centers **79** and **81**, to obtain contact between the rollers **103** and ridge **53**, with minimum backlash.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A detachable bolster unit for use on a press having a bed, a reciprocable ram movable toward and away from the bed, drive means for the ram, and a power take-off from said drive means; said bolster unit comprising a bolster plate having an upper work surface for positioning and supporting a fixture independently of any direct connection between said fixture and said bed, said plate being adapted for attachment and detachment to and from the bed with the fixture on the work surface so as to position the fixture in the path of movement of the ram, movable indexing means and a drive connection therefor carried by the plate, said drive connection adapted to be connected with said power take-off, said plate, indexing means and drive connection forming a portable unit adapted prior to attachment of the unit to the bed of the press and at a point removed from the press to have a fixture properly located on said surface in proper fixed relationship to said indexing means and to the ram path, said indexing means being constituted by a ridge cam rotatable on a substantially horizontal axis, a rotatable member carrying cam-follower rollers adapted to rotate on a substantially vertical axis, said rotatable member carrying a substantially horizontal indexing plate spaced from and overhanging said fixture-supporting surface for cooperation with the fixture.

2. A bolster unit according to claim 1, wherein said bolster plate is provided with means forming a liquid-tight sump to contain lubricant for said cam and rollers, said sump forming part of the detachable unit.

3. A bolster unit according to claim 1, including a horizontally movable eccentric support for the rotatable member whereby it may be moved to and from the cam to remove backlash from between the rollers and the cam ridge.

4. A bolster unit according to claim 1, wherein said bolster plate is provided with means forming a liquid-tight sump for containing lubricant for said cam and rollers, and including a horizontally movable eccentric support for the rotatable member whereby it may be moved to and from the cam to remove backlash from between the rollers and the cam ridge which are located in said sump.

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