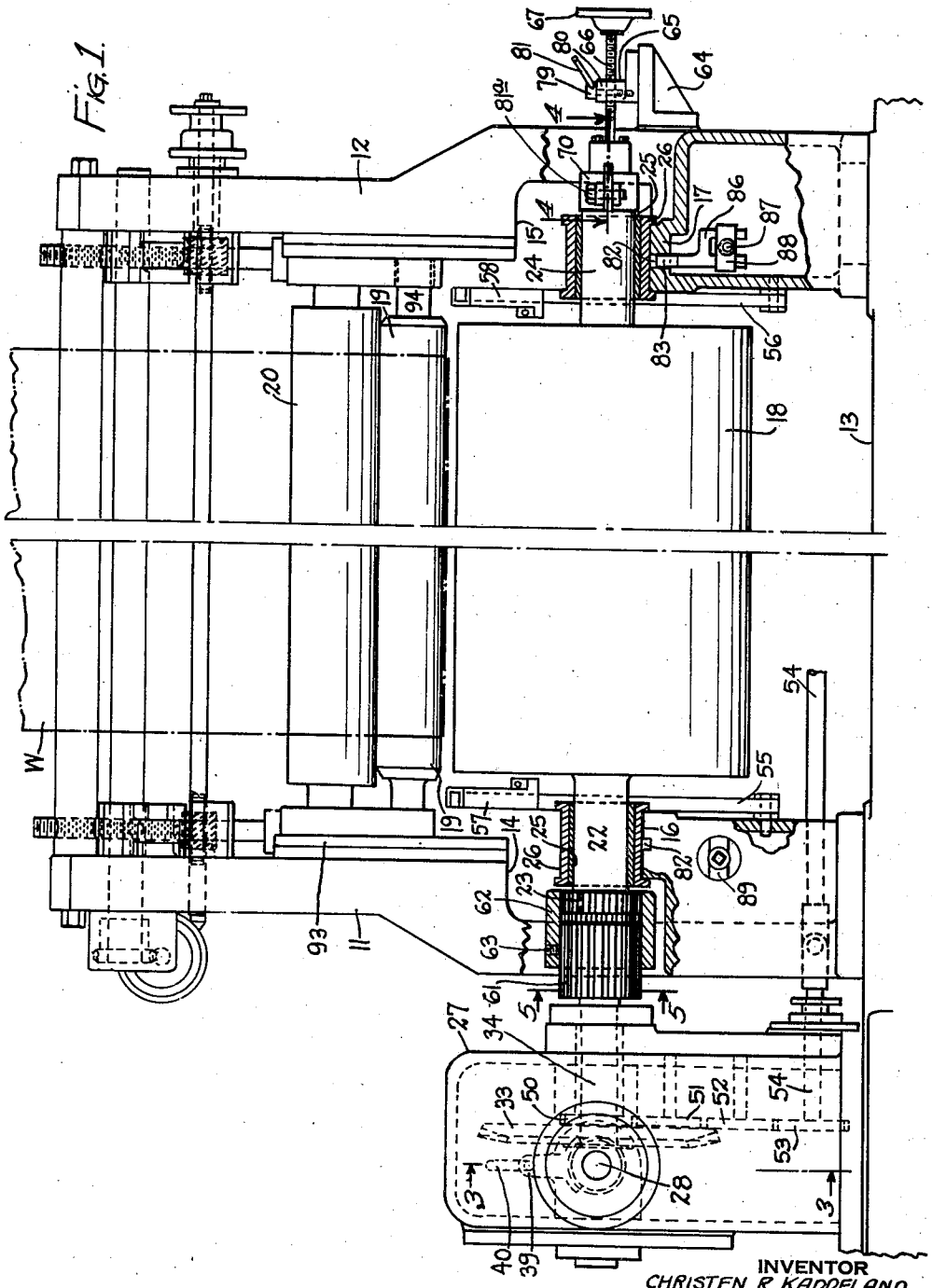
Dec. 15, 1936. C. R. KADDELAND 2,064,168

PRINTING PRESS

Filed May 20, 1933 2 Sheets-Sheet 1

FIG. 1.



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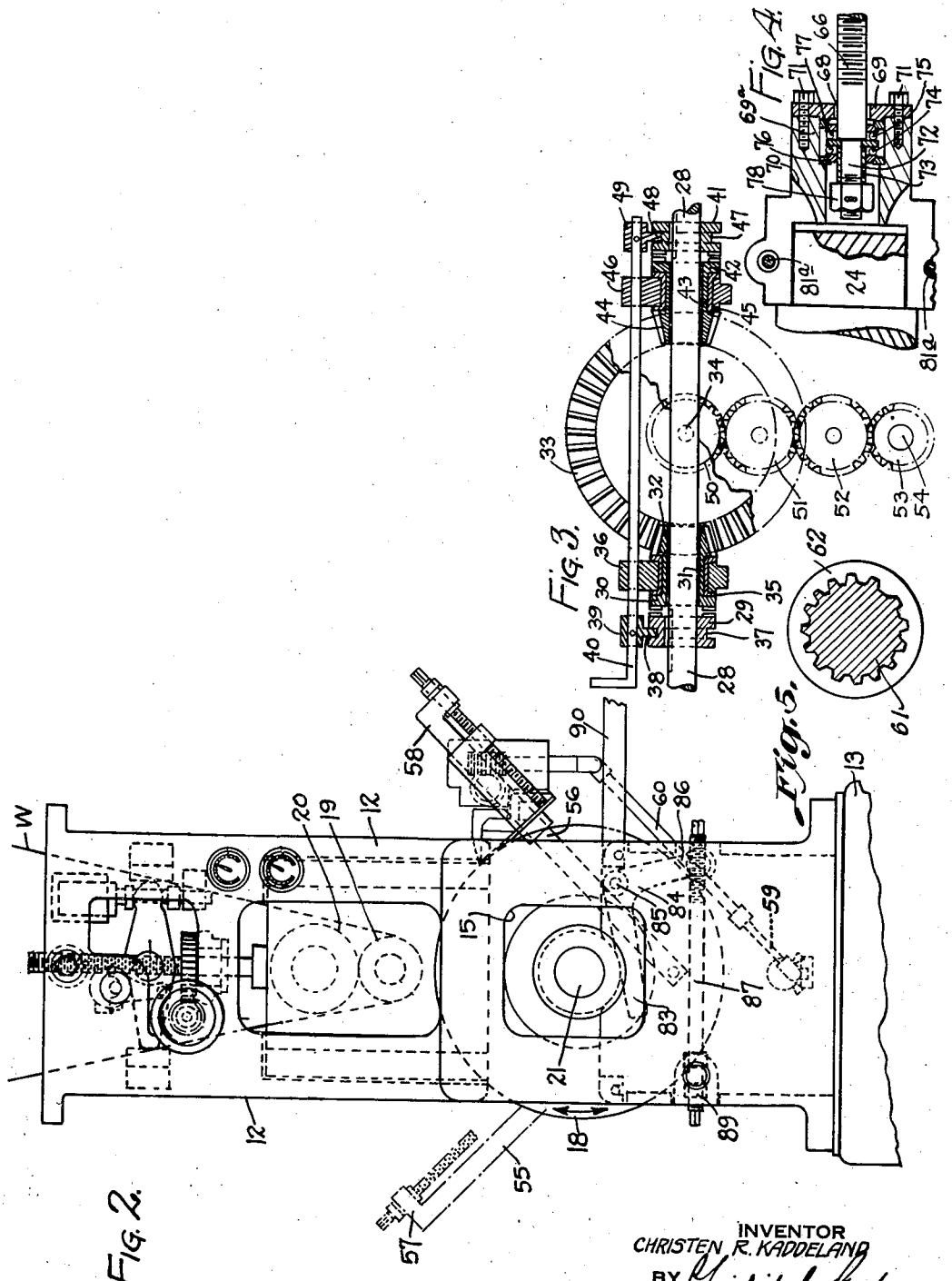


FIG. 2.

FIG. 4.

FIG. 3.

FIG. 5.

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PRINTING PRESS

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24 Claims. (Cl. 101—157)

My invention relates to certain improved devices used in conjunction with rotary printing presses, and more particularly relates to web printing presses and especially to web gravure presses printing from intaglio cylinders.

The objects of my invention are, among other things, to provide a novel and simplified type of rotary printing press in which the printing cylinder is both laterally adjustable in the press frames as well as reversibly rotatable, the frames being formed with laterally extending reentrant spaces on either side to permit such cylinder to be readily removed from, and likewise installed in, the frames from either end of the printing unit which arrangement has peculiar advantages in presses of the gravure type.

A further feature of my invention is the provision of improved mechanism for lifting the printing cylinder from its bearings in the frames to permit the removal of the cylinder by running same off on pivoted runway bars, which mechanism may also be utilized in placing the cylinder in the press frames in printing relation in the unit. The reentrant spaces also allow for a ready exchange of printing cylinders which is an important advantage in rotary gravure presses.

A further feature of my invention is the provision of a novel reversible clutch drive for the printing cylinder which is laterally slidable in the press frames to permit the cylinder to be rotated in either direction as well as to be readily removed or installed in the press frames to suit printing requirements as hereinbefore described.

Further objects and advantages will appear hereinafter and be particularly pointed out in the claims, and the drawings show a preferred embodiment of my invention as applied to a web gravure rotary printing press, but my improvements are not necessarily restricted to any particular form or type of rotary printing press construction.

In the drawings, Fig. 1 is a front elevation of a web gravure printing press embodying my improvements, certain parts being shown in vertical section;

Fig. 2 is a side elevation looking from the right of Fig. 1;

Fig. 3 is a side view partly in section on the line 3—3 of Fig. 1;

Fig. 4 is an enlarged sectional view on the line 4—4 of Fig. 1;

Fig. 5 is a sectional view on the line 5—5 of Fig. 1.

Similar numerals refer to similar parts throughout the several figures.

Referring to the figures and more particularly to Figs. 1 and 2, the press frames 11 and 12 are mounted on the base 13 in spaced apart relation with the lower part of the frames 11 and 12 having the reentrant spaces 14 and 15 formed respectively therein to allow space for the projecting ends of the cylinder shaft when the cylinder is removed or installed. The standards 16 and 17 preferably integral with the frames 11 and 12, afford fixed socket bearing supports for this cylinder shaft as shown in Fig. 1.

The press proper, preferably a web gravure press, comprises the printing cylinder 18, the therewith coacting rubber cylinder 19 and the pressure cylinder 20 which is adapted to exert pressure on the cylinder 19. The web W is shown in Figs. 1 and 2 in printing relation with the cylinders 18 and 19, and the cylinders 19 and 20 are illustrated in their raised position with the web W out of contact with the printing cylinder 18 when the press is stopped and no printing is taking place.

The printing cylinder shaft 21 is driven from its left end 22 (Fig. 1) by the gear 23 fastened to the shaft end 22. The right end 24 carries the mechanism for laterally shifting the printing cylinder 18 relatively to the press frames 11 and 12 to secure proper side registration of the cylinder. The shaft ends 22 and 24 each carry similar bushings 25 that are carried in the sleeves 26 which are journalled in the socketed portions of the standards 16 and 17 on which fixed bearings the cylinder shaft 21 is rotatably mounted, the width of the reentrant spaces 14 and 15 being greater than the axial length of the cylinder 18 and the cylinder shaft 21.

The means for driving the printing cylinder 18 through its shaft 21 in either direction will now be described: On the left side of Fig. 1 is the housing 27 in which is journalled the main drive shaft 28 actuated from any suitable source of power (not shown). Slidably keyed at left end (Fig. 3) of the shaft 28 is the clutch gear 29 adapted to removably engage with the clutch gear 30 mounted on the sleeve 31 which encircles the shaft 28 and is freely rotatable thereon. The inner end of the sleeve 31 carries the bevel pinion 32 that engages the large bevel gear 33 fast to the cross-shaft 34 journalled in the housing 27. Surrounding the sleeve 31 is the bearing collar 35 carried by the bracket plate 36 secured within the housing 27. The clutch gear 29 is exteriorly grooved at 37 in which groove 37 rides the nose 38 of the bracket 39 pinned to the slidable control

rod 40 that is laterally shiftable in the bracket plate 36.

On the right side of Fig. 3 a similar construction is shown comprising the clutch gear 41 slidably keyed to the shaft 28 which gear 41 is adapted to removably engage with the clutch gear 42 mounted on the sleeve 43 which also encircles the shaft 28 and is freely rotatable thereon. The inner end of the sleeve 43 carries the bevel pinion 44 that engages the bevel gear 33 opposite to the bevel pinion 32. Surrounding the sleeve 43 is the bearing collar 45 carried by the bracket plate 46 secured within the housing 27. The clutch gear 41 is exteriorly grooved at 47 in which groove 47 rides the nose 48 of the bracket 49 that is pinned to the end of the control rod 40 that also slides in the bracket plate 46 as well as the plate 36.

By this mechanism the constantly rotating drive shaft 28 will impart a rotative movement to the cross-shaft 34 in either direction through the large bevel gear 33 depending on whether the clutch gears 29 and 30 are operatively engaged to drive the gear 33 in one direction through the bevel pinion 32, or whether the clutch gears 41 and 42 are operatively engaged to drive the gear 33 in the opposite direction through the bevel pinion 44. The lateral shifting of the control rod 40 through the brackets 39 and 49 determines whether one set of clutch gears 29 and 30 or the other set of clutch gears 41 and 42 are in engagement with one another. When one set is disengaged its particular bevel pinion (32 or 44) is free to rotate on the shaft 28 through the gear 33 and is not driven by its set of clutch gears (29 and 30 or 41 and 42) which happen to be disengaged so as not to interfere with the predetermined direction of rotation to be imparted to the cross shaft 34.

Fastened to the cross shaft 34 is the pinion 50 which through a pair of idler gears 51 and 52 drives the pinion 53 fastened to the end of the shaft 54 journalled in the housing 27 and press frame 11 in either direction as shown in Figs. 1, 2, and 3.

Pivoted to the press frames 11 and 12 are the two swinging arms 55 and 56 which support the end brackets 57 and 58 respectively in which is mounted a novel type of ink fountain and ink distribution devices adapted to be located on either side of the printing cylinder 18 as shown in Fig. 2 depending upon the direction of rotation of the cylinder 18 and also permits this cylinder to be exchanged from either side of the reentrant press frames without interference with the ink fountains and doctor blades by mechanism hereinafter described. The shaft 54 imparts a rotary movement by bevel gears (not shown) to the adjustable shaft 59 carrying mechanism to rotate the shaft 60 which carries the cam-operated devices for reciprocating the usual doctor blade for removing surplus ink from the printing cylinder 18 in gravure presses.

Since this ink distribution system is the subject matter of a co-pending application, it is not necessary to describe the structural details in this case. Such mechanism has a peculiar advantage in web gravure presses such as are shown herein.

Referring to Figs. 1 and 5, the inner end of the cross shaft 34 has fastened thereto the wide-toothed gear 61 of similar size and teeth to, and in transverse alinement with, the gear 23 on the cylinder shaft 21. Surrounding both the gear 23 and the gear 61 is the interiorly tooth gear sleeve 62 which is slidable on the gears 23 and 61 and is fastened in any predetermined position on the gear 61 by the screw-pin 63. By sliding the sleeve 62 to the left in Fig. 1, the gears 23 and 61 are thereby disconnected and the cylinder 18 may be removed from the press. In Fig. 1, the gears 23 and 61 are operatively connected to rotate the cylinder 18 in either direction by the mechanism within the housing 27 hereinbefore described.

Means are provided for laterally adjusting the printing cylinder 18 in the press frames 11 and 12 best shown in Figs. 1 and 4: Mounted on the bracket 64 fastened to the frame 12 is the interiorly threaded standard 65 through which passes the screw-bolt 66 having the handle 67 fastened to its outer end. The inner end of the bolt 66 passes through the hole 68 of circular plate 69 removably held to the outer reduced end of the coupling 70 for the cylinder shaft 21 by screw-bolts 71.

Within a socket cut in the end 69a of the coupling 70, the screw-bolt 72 portion of the screw-bolt 66 projects, this screw-bolt portion 72 being of smaller diameter than the screw-bolt 66 as shown in Fig. 4. The sleeved collar 73 carried by the bolt 72 divides a double set of ball bearings 74 and 75 which are held in position by the outer washers 76 and 77 within the socketed opening of the coupling 70. The lock nut 78 threaded on the inner end of the bolt 72 holds the various parts in operative position. By manipulating the handle 67 the cylinder 18 may be laterally shifted in its bearings through the coupling 70 to make the proper adjustments in either direction, and the screw-bolt 66 is locked in any predetermined position by the locking bolt 79 tapped into the standard 65 and bearing on the plate 80 above the bolt 66. The handle 81 is removably secured to the head of the locking bolt 79 as shown in Fig. 1. The coupling 70 is fastened to the end 24 of the cylinder shaft 21 by the clamping nuts 81a as shown in Fig. 1.

By these devices I have provided a ball thrust bearing for this end 24 of the cylinder shaft 21 by which the cylinder 18 may be laterally adjusted, and at the same time have provided means for disengaging the end 24 of the cylinder shaft 21 within the space 15 so that the cylinder 18 may be readily removed and a different cylinder installed in the press when required.

Means are provided for removing and installing the printing cylinder 18 that are shown in Figs. 1 and 2: Such means are duplicated on either side of the press to be mounted in the standards 16 and 17, and a description of one set will suffice for both. Such standards 16 and 17 have vertical slots 82 cut therein through which project the arms 83 of the levers 84 pivoted on the stub shafts 85 secured in the standards 16 and 17, such arms 83 being adapted to bear on the under sides of the collars 26. The lower arms 86 of levers 84 are forked (Fig. 1), through which the threaded bars 87 pass and carry the blocks 88 that are threaded on the bars 87 while the opposite ends of the bars 87 are threaded to pass through plates 89 set in the press frames.

The tips of the bars 87 are squared for a wrench so that the pressman may operate same from either side of the press to rotate the bars 87 and thereby rock the levers 84 on the shafts 85 in either direction. Pivoted to the press frames 11 and 12 in proximity to the stub shafts 85 (Fig. 2) are the runway bars 90 to afford a track upon which the cylinder shaft ends 22 and 24 may roll in removing or installing a cylinder in the press. By raising the arms 82 the cylinder 18 and its shaft ends 22 and 24 will be partly

lifted from its operative position in the press, and such cylinder may then be rolled out of the press frames 11 and 12 on the runway bars 90. In installing a cylinder the reverse operation takes place, and the cylinder shaft ends 22 and 24 are lowered into their bearings on the standards 16 and 17 when the arms 83 are lowered through the slots 82 as shown more particularly in Fig. 1 where such arms 82 are no longer in contact with the collars 26 of the cylinder shaft ends 22 and 24.

The operations of the various different mechanisms and devices in my improved press have been described in conjunction with the separate descriptions of their structural details. However the general operations may be summarized as follows: When it is desired to install or remove a printing cylinder 18 in the press, the mechanism shown in Figs. 1 and 2 with the runway bars 90 coacting with the lever arms 84 is used either to install or remove the cylinder 18 in the press frames with the reentrant spaces 14 and 15 affording sufficient width for the shaft ends 22 and 24 and the cylinder travelling on the runway bars 90 and arms 84 to or from its bearings in the press.

Then the gear sleeve 62 is laterally shifted to engage both the gears 23 and 61, and is fastened by the pin 63 to connect up the driving apparatus contained in the housing 27. The control rod 40 is then shifted to determine the direction of rotation of the cylinder 18, the whole constituting a reversible clutch drive that is detachably connected to the cylinder shaft end 22, such drive being laterally movable within the reentrant space 14 to free the shaft end 22 when required to remove a printing cylinder in the press. A lateral adjustment of the cylinder 18 is secured by manipulating the handle 67 as before described.

My invention, in its broader aspects, is not limited to the particular construction and arrangement of the cylinders and associated mechanism as shown in the rotary web gravure printing press illustrated in the drawings, since many changes may be made without departing from the main principles of the invention and without sacrificing its chief advantages in use. Furthermore my improvements may be embodied in rotary printing presses of various types where it is particularly desirable to secure delicate pressure adjustments between the cylinders comprising the printing unit as well as to provide simplified means for exchanging cylinders as required.

I claim as my invention:—

1. In a printing press, a rotary cylinder having axially extended journal bearings at either end removably mounted in oppositely disposed press frames, said frames having complementary outwardly bulging portions in alinement with said journal bearings to provide a passage of greater width than the axial length of said cylinder and bearings, said cylinder and its extended journal bearings being as a unit transversely installable in, or removable from, the press through said passage at right angles to the axis of the cylinder at both sides of the press.

2. In a printing press, a rotary cylinder having axially extended shaft ends and journal bearings at either end removably mounted in oppositely disposed press frames, said frames having complementary outwardly bulging portions in alinement with said journal bearings to provide a passage of greater width than the axial length of said cylinder and bearings, said cylinder and its extended shaft ends and journal bearings being as a unit transversely installable in, or removable from, the press through said passage at right angles to the axis of the cylinder at both sides of the press.

3. In a rotary gravure printing press, a printing cylinder having axially extended journal bearings at either end removably mounted in oppositely disposed press frames, said frames having complementary outwardly bulging portions in alinement with said journal bearings to provide a passage of greater width than the axial length of said cylinder and bearings, a doctor blade mechanism coacting with said cylinder and shiftable to either side of the vertical diameter of said cylinder, said cylinder and its extended journal bearings being as a unit transversely installable in, or removable from, the press through said passage at right angles to the axis of the cylinder at both sides of the press in directions opposite to said doctor blade mechanism.

4. In a rotary gravure printing press, a printing cylinder having axially extended journal bearings at either end removably mounted in oppositely disposed press frames, said frames having complementary outwardly bulging portions in alinement with said journal bearings to provide a passage of greater width than the axial length of said cylinder and bearings, a doctor blade mechanism coacting with said cylinder and shiftable to either side of the vertical diameter of said cylinder, said cylinder and its extended journal bearings being as a unit transversely installable in, or removable from, the press through said passage at right angles to the axis of the cylinder opposite the position of said doctor blade mechanism.

5. In a printing press, spaced apart press frames supporting a rotary printing cylinder having axially extended shaft ends and journal bearings, and a therewith coacting impression mechanism, said frames having complementary outwardly bulging portions in alinement with said journal bearings to provide a passage of greater width than the axial length of said cylinder shaft ends and bearings, through which passage the cylinder and its associated parts may be as a unit transversely installable in, or removed from, the press at right angles to the axis of the cylinder when the impression mechanism is out of printing relation with the printing cylinder.

6. In a printing press, spaced apart frames containing bearing housings, a printing cylinder having axially extended shaft ends removably mounted in said housings, said frames having complementary outwardly bulging portions in alinement with said shaft ends to provide a passage of greater width than the total axial length of said cylinder and shaft ends, means for raising and lowering said shaft ends relatively to said housings, and drive connections detachably secured to one of said shaft ends for rotating said cylinder in either direction.

7. In a printing press, spaced apart frames containing bearing housings, a printing cylinder having axially extended shaft ends removably mounted in said housings, said frames having complementary outwardly bulging portions in alinement with said shaft ends to provide a passage of greater width than the total axial length of said cylinder and shaft ends, means for raising and lowering said shaft ends relatively to said housings, and means for shifting the lateral position of said cylinder in said housings.

8. In a printing press, spaced apart frames containing bearing housings, a printing cylinder having axially extended shaft ends removably mounted in said housings, said frames having complementary outwardly bulging portions in alinement with said shaft ends to provide a passage of greater width than the total axial length of said cylinder and shaft ends, means for raising and lowering said shaft ends relatively to said housings, and means for shifting the lateral position of said cylinder in said housings in either direction.

9. In a printing press, spaced apart frames containing bearing housings, a printing cylinder having axially extended shaft ends removably mounted in said housings, said frames having complementary outwardly bulging portions in alinement with said shaft ends to provide a passage of greater width than the total axial length of said cylinder and shaft ends, means for raising and lowering said shaft ends relatively to said housings, drive connections detachably secured to one of said shaft ends for rotating said cylinder in either direction, and means for shifting the lateral position of said cylinder in either direction during its rotation.

10. In a printing press, a rotary cylinder having axially extended shaft ends rotatably mounted in fixed sockets carried in the spaced apart press frames, said frames having complementary outwardly bulging portions in alinement with the shaft ends of greater width than the axial length of the cylinder and shaft ends to provide an enlarged horizontally-disposed passage within which the cylinder and its shaft ends may be transversely installed in, or removed from, the fixed sockets in said frames, and a reversible clutch drive detachably secured to one of said shaft ends for rotating said cylinder in either direction, said drive being laterally shiftable to detach same from said shaft end of the cylinder to permit said cylinder and shaft ends to be removed as a unit from the press.

11. In a printing press, a rotary cylinder having axially extended shaft ends rotatably mounted in fixed sockets carried in the spaced apart press frames, said frames having complementary outwardly bulging portions in alinement with the shaft ends of greater width than the axial length of the cylinder and shaft ends to provide an enlarged horizontally-disposed passage within which the cylinder and its shaft ends may be transversely installed in, or removed from, the fixed sockets in said frames, a reversible clutch drive detachably secured to one of said shaft ends for rotating said cylinder in either direction, said drive being laterally shiftable to detach same from said shaft end of the cylinder to permit said cylinder and shaft ends to be removed as a unit from the press, and means coacting with the other shaft end for shifting the lateral position of said cylinder in either direction.

12. In a printing press, a framed structure having spaced apart side members having complementary outwardly bulging portions to provide an enlarged horizontally disposed passage between said members, and means on the side members in the zones of said bulging portions to support a rotary design cylinder having axially extending trunnions resting on said supporting means.

13. In a printing press, a framed structure having spaced apart side members having complementary outwardly bulging portions to provide an enlarged horizontally disposed passage between said members, a rotary removable design cylinder having axially extending trunnions resting on supports in said side members in the zones of said bulging portions, said passage and said cylinder being relatively proportioned axially of the cylinder to permit removal and installation of said cylinder through either end of said passage.

14. In a printing press, a framed structure having spaced apart side members having complementary outwardly bulging portions to provide an enlarged horizontally disposed passage between said side members for a rotary removable design cylinder having axially extending trunnions, a fixed support for said cylinder and trunnions on said side members located within said passage, and means extending through one of the said side members into said passage for rotating said cylinder.

15. In a printing press, a framed structure having spaced apart side members having complementary outwardly bulging portions to provide an enlarged horizontally disposed passage between said side members for a rotary removable design cylinder, having axially extending trunnions supported on said side members within the zones of said bulging portions, and means extending through one of the said side members into said passage for adjustably holding said design cylinder in its lateral position.

16. In a printing press, a framed structure having spaced apart side members having complementary outwardly bulging portions to provide an enlarged horizontally disposed passage for a removable design cylinder located within said passage, means including a detachable drive connection projecting through one of said side members for rotating said cylinder and detachable means extending through the other side member for holding said cylinder in its lateral position.

17. In a printing press, a framed structure having spaced apart side members having complementary outwardly bulging portions to provide an enlarged horizontally disposed passage, a removable design cylinder with integral axially extending journals, coacting bearings arranged on said side members within the zones of said bulging portions, and means located within said passage for removing said cylinder through either end of said passage.

18. In a printing press, a framed structure having spaced apart side members having complementary outwardly bulging portions to support on said side members a removable design cylinder rotatable in either direction, a doctor supporting and actuating mechanism shiftable to either side of said cylinder, said cylinder being installable in, or removable from, the press in a direction opposite from said doctor mechanism.

19. In a printing press, a framed structure having spaced apart side members having complementary outwardly bulging portions to provide an enlarged horizontally disposed passage proportioned to receive a removable design cylinder rotatable in either direction and having laterally extending trunnions, coacting bearings on said side members for said cylinder, a doctor actuating mechanism shiftable to either side of said cylinder according to its direction of rotation, said cylinder being installable in, or removable from, the press in directions opposite to said doctor mechanism.

20. In a printing press, a removable rotary

printing cylinder having axially extending shafts, detachable driving means to rotate said cylinder, a coacting impression roller, a framed structure including fixed supports for said printing cylinder, spaced apart members to guide the adjustable pressure roller having a passage between said members of greater width than the total length of the printing cylinder and shafts through which passage the printing cylinder can be removed and installed from either end of the press.

21. In a printing press, a rotary cylinder having axially extended journal bearings removably mounted in oppositely disposed press frames, said frames being sufficiently spaced apart in alinement with said journal bearings to provide a passage of greater width than the axial length of said cylinder and bearings, said cylinder and its extended journal bearings being supported inside said press frames and as a unit transversely installable in, or removable from, the press through said passage at right angles to the axis of the cylinder at both sides of the press.

22. In a printing press, a framed structure having its side members sufficiently spaced apart to provide an enlarged horizontally disposed passage between said members, a rotary removable design cylinder having axially extended trunnions supported inside said side members, said passage and said cylinder with its trunnions being proportioned axially of the cylinder to permit removal and installation of said cylinder through either end of said passage.

23. In a printing press, a framed structure having its side members sufficiently spaced apart to provide a horizontally disposed passage between said members, a rotary removable design cylinder having axially extended trunnions supported inside said side members, a doctor supporting and actuating mechanism shiftable to either side of said cylinder, said passage and said cylinder with its trunnions being relatively proportioned axially of the cylinder to permit removal and installation of said cylinder in a direction opposite to said doctor mechanism.

24. In a printing press, a framed structure having its side members sufficiently spaced apart to provide a horizontally disposed passage between said members, a rotary removable design cylinder having axially extended trunnions supported inside said side members, a coacting pressure roller, said passage and said cylinder with its trunnions being relatively proportioned axially of the cylinder to permit removal and installation of said cylinder through either end of said passage, and means for raising and lowering said pressure roller within said passage and relatively to said cylinder.

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