

June 1, 1965

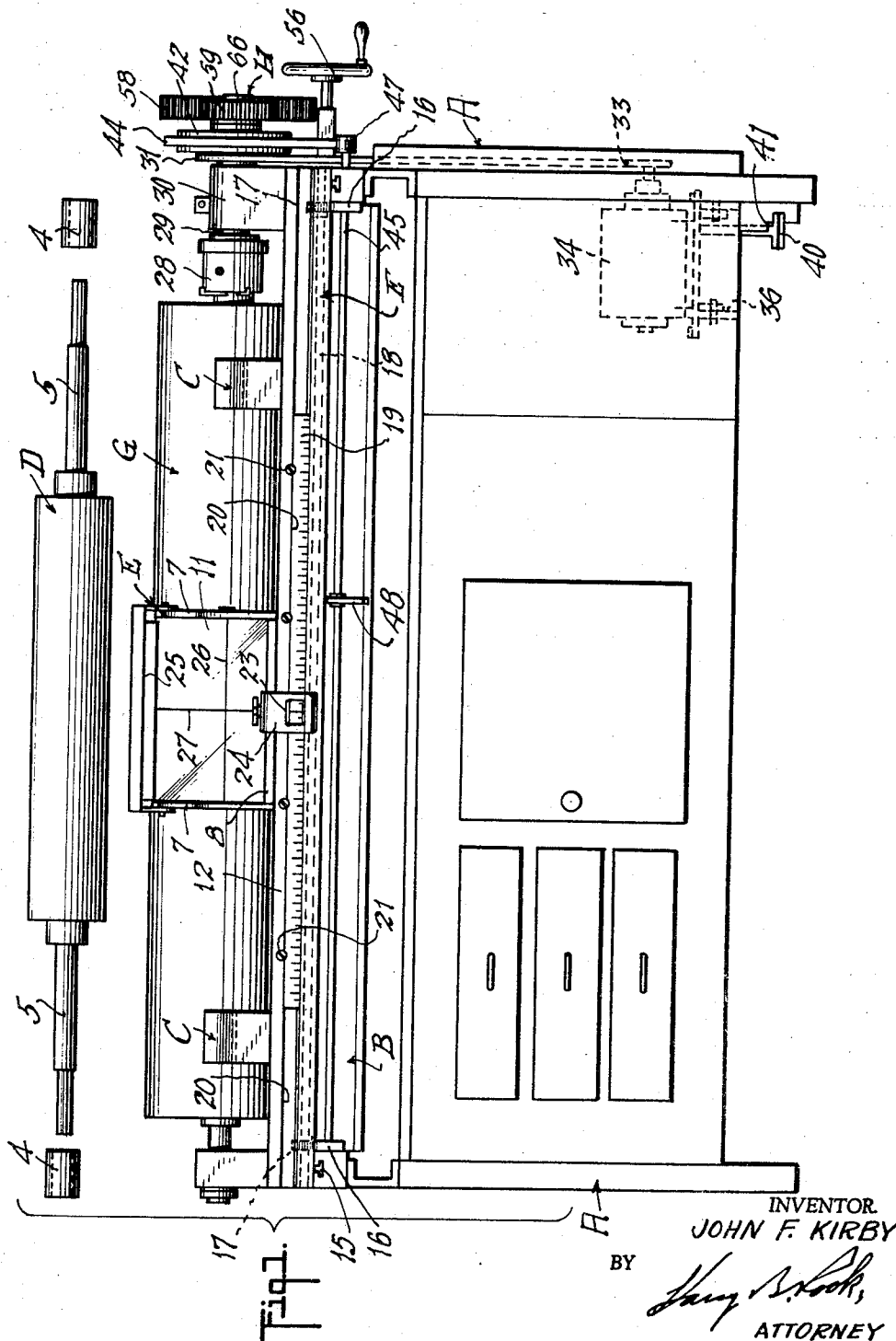
J. F. KIRBY

3,186,336

MACHINE FOR MOUNTING AND PROOFING PRINTING PLATES

Filed Nov. 27, 1962

4 Sheets-Sheet 1



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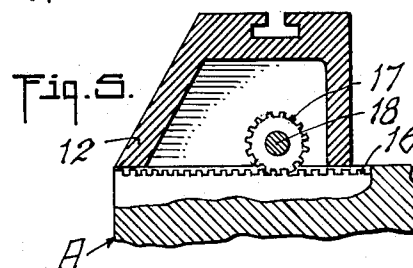
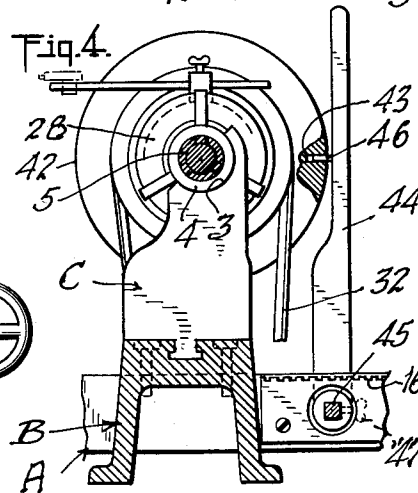
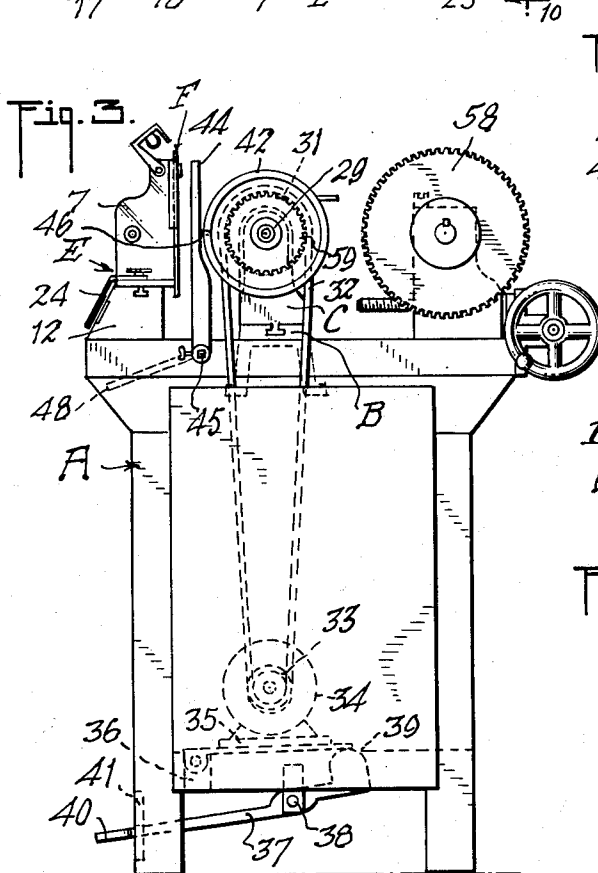
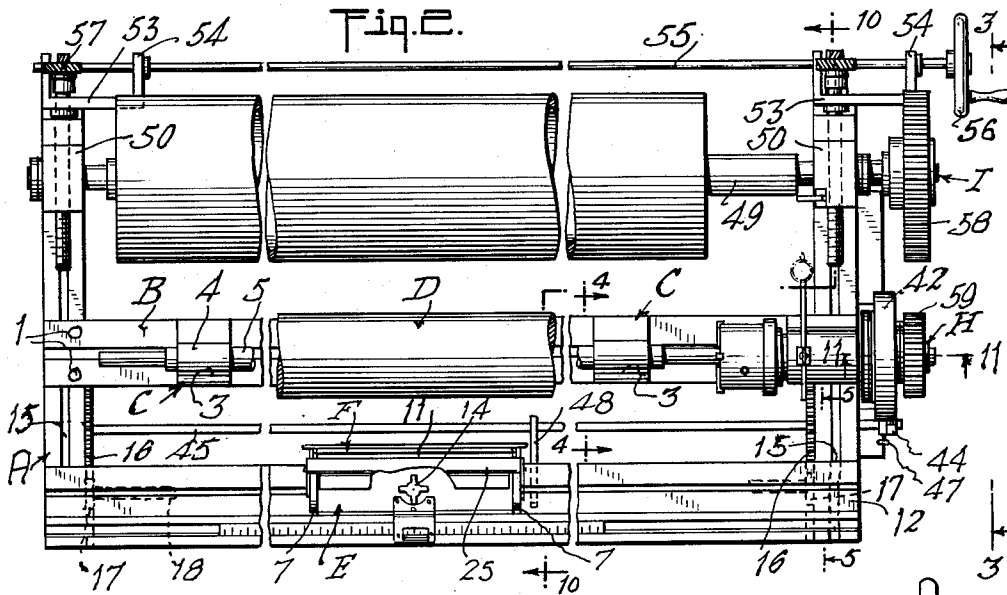
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MACHINE FOR MOUNTING AND PROOFING PRINTING PLATES

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4 Sheets-Sheet 2



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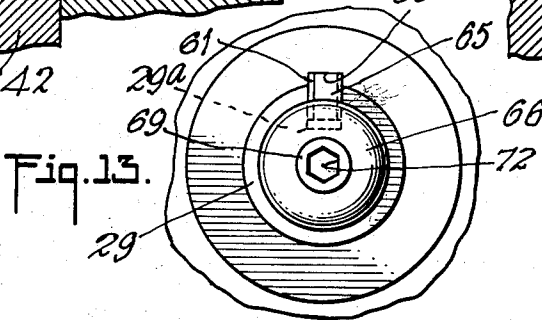
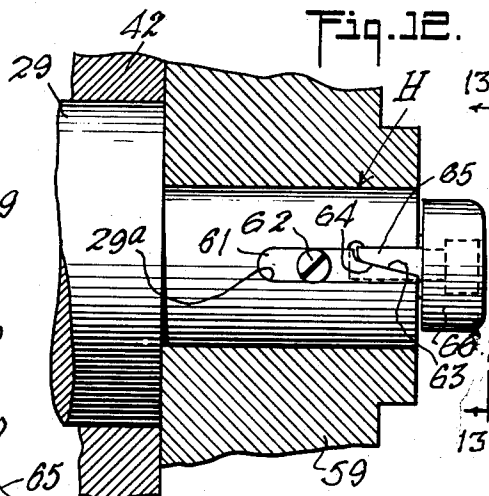
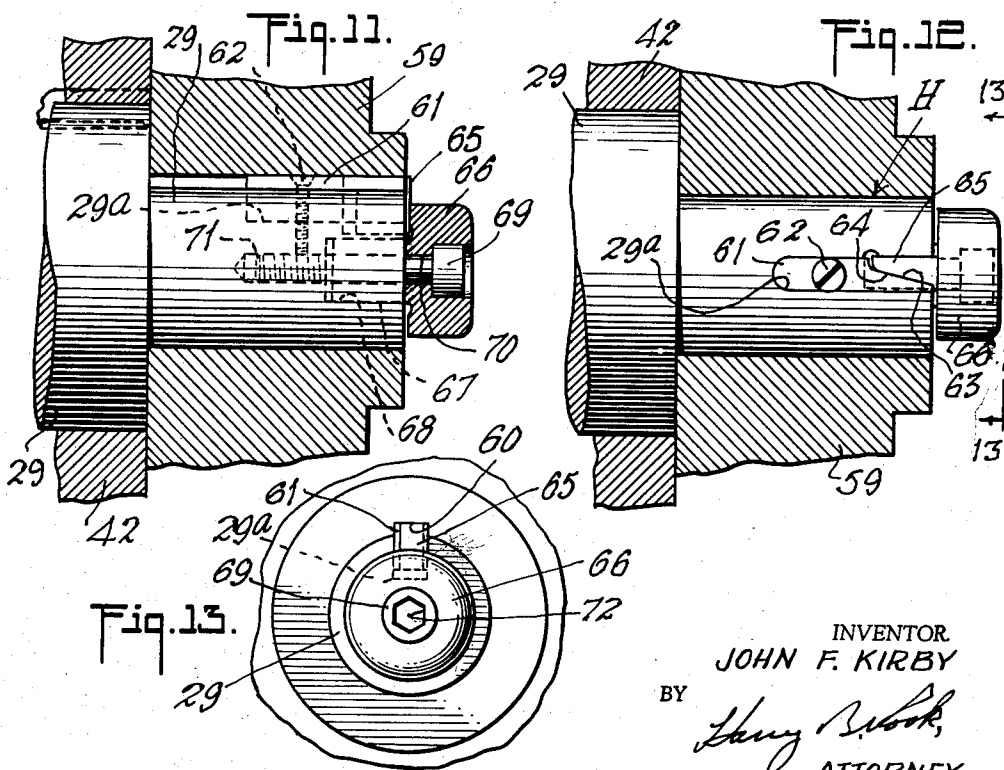
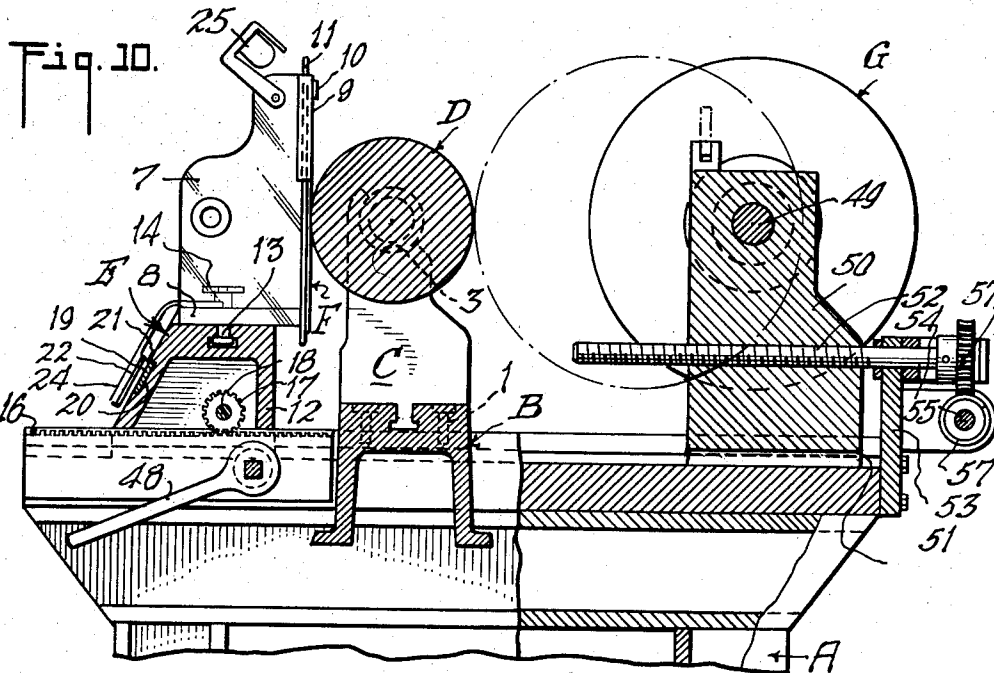
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MACHINE FOR MOUNTING AND PROOFING PRINTING PLATES

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4 Sheets-Sheet 4



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3,186,336

MACHINE FOR MOUNTING AND PROOFING PRINTING PLATES

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9 Claims. (Cl. 101-216)

This invention relates in general to a machine for mounting printing plates on printing cylinders and for taking a proof impression of the printing plates on a proof cylinder.

In general, the machine includes a frame having means for removably supporting a plate cylinder, a plate-aligning mechanism for accurately positioning a printing plate on the printing cylinder, a proof cylinder upon which is made a proof impression of the printing plates that have been mounted on the plate cylinder, and means such as a dividing head for circumferentially indexing the plate cylinder so that the cylinder may be located in any of a plurality of desired angular positions.

One object of the invention is to provide a machine of this character which has a novel and improved plate-aligning mechanism including a substantially vertical support for the printing plate, and means for readily positioning the plate support at different points longitudinally of the plate cylinder.

Another object is to provide in such a plate-mounting and proofing machine, a novel and improved construction and combination of a chuck mounted on a stub shaft journaled in the machine frame to be connected to one end of the plate cylinder and having a driving gear rigidly connected to its other end, and a dividing disc connected to said stub shaft and provided with multiple rows of holes, such as five circumferential rows including respectively, four, six, eight, ten and twelve holes, with which cooperate a locking pin or a locking arm, whereby a plurality of printing-plate sections, each corresponding in size respectively to different portions of the circumference of the plate cylinder, can be applied at different positions along the lengths of the cylinder.

Still another object is to provide a printing-plate aligner wherein the plate is supported on the holder by magnetic force, thereby providing for easy and accurate adjustment of the plate on the support.

It is another object of the invention to provide in a plate-aligning mechanism a novel and improved adjustable ruler gauge for accurately locating the plate support at any of a plurality of desired positions spaced longitudinally of the plate cylinder.

It is desirable that the ratio of the drive between the plate cylinder and the impression cylinder be changeable to compensate for changes in the diameters of the cylinders, and therefore, another object of the invention is to provide a novel and improved easily and quickly changeable gearing between the plate cylinder and the impression cylinder.

Other objects, advantages and results of the invention will be brought out by the following description in conjunction with the accompanying drawings in which:

FIGURE 1 is a front elevation of a machine embodying the invention and showing the plate cylinder displaced from its bearings for clearness in illustration;

FIGURE 2 is a top plan view of the machine showing the plate cylinder in its mounted position and with portions of the machine broken away;

FIGURE 3 is an end elevation of the machine taken from the plane of the line 3-3 of FIGURE 2;

FIGURE 4 is an enlarged fragmentary vertical sectional view approximately on the plane of the line 4-4 of FIGURE 2;

FIGURE 5 is a similar view on the plane of the line 5-5 of FIGURE 2;

FIGURE 6 is an enlarged fragmentary front elevational view of the plate holder supporting a printing plate in operative relation to the plate cylinder;

FIGURE 7 is a rear elevation of the parts shown in FIGURE 6 with the impression cylinder removed and portions of the plate cylinder broken away;

FIGURE 8 is a top plan view of the parts shown in FIGURE 7;

FIGURE 9 is a development of the periphery of the dividing disc;

FIGURE 10 is an enlarged transverse vertical sectional view on the plane of the line 10-10 of FIGURE 2;

FIGURE 11 is a fragmentary longitudinal vertical sectional view approximately on the plane of the line 11-11 of FIGURE 2, showing the keyed connection of the driving gear to the chuck shaft;

FIGURE 12 is a fragmentary horizontal sectional view; and

FIGURE 13 is a fragmentary end elevation approximately from the plane of the line 13-13 of FIGURE 12.

Specifically describing the illustrated embodiment of the invention, the machine includes a main frame having two end pieces A that are connected by at least one longitudinal bar B that is shown as secured to the end pieces by cap screws or bolts 1. On this bar are mounted two pillow blocks C for removably supporting the plate cylinder D. As shown, the pillow blocks C are slidable toward and from each other longitudinally of the bar and have tongue and groove connections with the bar; and the upper ends of the pillow blocks have upwardly facing recessed seats 3 in which bearing bushings 4 mounted on the spindles or trunnions 5 of the plate cylinder are adapted to seat by gravitational action, thereby to rotatably support the plate cylinder in said pillow blocks.

In front of the plate cylinder at the top of the frame is a holding and aligning mechanism E for the printing plate F which is formed of flexible material and generally has a plurality of printing portions 6 formed of rubber. The plate F is supported in substantially a vertical plane in front of the plate cylinder by magnetic force. As shown, said mechanism comprises a vertical holder shown as including two end pieces 7 that are secured to opposite ends of a base piece 8, and on the edge of each end piece 7 that is juxtaposed to the pillow blocks C and the plate cylinder mounted thereon, there is secured a permanent magnet 9 with which coacts a flexible self-sustaining strip 10 of magnetic material such as steel and which is normally attracted to and held by the magnets 9 as best shown in FIGURES 7 and 8. Mounted between the end pieces 7 is vertically disposed a rigid sheet of transparent material 11, for example, Lucite, whose plane is preferably inclined approximately two degrees to the vertical and upwardly and away from the axes of the seats 3 of the pillow blocks or the axis of the plate cylinder when the latter is mounted in the pillow blocks. With this construction, a printing plate is placed in the holder by adhesively attaching the upper edge of the printing plate to the support strip 10 and then placing said support strip in magnetic contact with the magnets 9 as shown in FIGURE 7, the action of gravity on the printing plate causing the latter to lie flat against the plate-rest sheet as shown in FIGURES 7 and 10.

The vertical holder is mounted on a horizontal base bar 12 which is mounted on the top of the end pieces of the machine frame to move toward and from the axis of the pillow seats 3 and parallel thereto; and the base piece 8 of the holder has a tongue and groove connection 13 with the base bar 12 so that the holder can be slid longitudinally of the base bar and of the plate cylinder mounted in the pillow blocks so that the position of the printing plate can be adjusted longitudinally of a plate

cylinder. A suitable known type of clamping bolt and nut 14 are provided for locking the holder in the desired position on the base bar.

The base bar is shown as having a tongue and groove connection 15 with each of the end pieces A of the machine frame so that the base bar can be moved with a straight-line action toward and from the axis of the plate cylinder. To ensure that the bar shall move in exact parallelism to the axis of the plate cylinder, a gear rack bar 16 is mounted on the inner side of each of the frame side pieces and has meshing therewith a pinion 17 that is rigidly connected to a shaft 18 which is journaled in the base bar. With this construction, accurate and non-jamming movement of the base bar is ensured regardless of whether manual force is applied at the ends of the base bar or at the center thereof.

It is desirable to provide means for indicating the position of the printing plate with respect to the length of the plate cylinder, and to this end, a ruler gauge 19 is slidably mounted in a groove 20 in the front face of the base bar and adjustably held in said groove by suitable means such as screws 21 that are threaded into the base bar with their heads overlapping the edges of the ruler gauge. The gauge is suitably graduated as shown in FIGURE 1 and coacting with said graduations is a transparent sight plate 22 having a usual hairline and extending across an opening 23 in a bracket arm 24 which is secured to the base piece of the holder and overlies the ruler gauge in spaced relation thereto. Desirably an electric lamp 25 is adjustably mounted on the end pieces 7 of the holder.

For mounting the printing plate on the plate cylinder, the plate-rest sheet 11 is provided with sight lines 26 and 27, the form of which is disposed in a common plane with the axis of the plate cylinder mounted in the pillow blocks, and the latter of which is perpendicular to the line 26. Thus, when the printing plate is connected to the magnetic support strip 10 and the latter is held in magnetic contact with the magnets 9, the printing plate can be accurately adjusted and lined up with respect to the plate cylinder as shown in FIGURES 6-8; and when the plate is properly aligned with the plate cylinder, the plate, which preferably has an adhesive back surface, is pressed against the plate cylinder as shown in FIGURES 8 and 10 and the cylinder is rotated while the printing plate is pressed against the periphery of the cylinder so as to apply the plate to the cylinder, the support strip 10 being pulled away from the printing plate at the proper time.

For rotating the plate cylinder, one spindle 5 of the plate cylinder is connected to a chuck 28 that has a shaft 29 journaled in a bearing block 30 on one of the frame end pieces A. Rigidly connected to the shaft 29 is a pulley 31 which is connected by a belt 32 to a drive pulley 33 on the output shaft of an electric motor 34 which is shown as mounted on a tiltable platform 35 on a sub-frame bracket 36 so that the tension on the belt can be varied by tilting of the platform 35 thereby to start and stop rotation of the shaft 29 and chuck. For tilting the platform, there has been shown a treadle lever 37 pivotally mounted intermediate its ends at 38 on the sub-frame bracket with one end 39 underlying the platform and the other end having a foot piece 40. The lever is held in position to loosen the belt and stop rotation of the shaft by means of a detent 41 on the frame which coacts with the lever as best shown in FIGURES 1 and 3.

For adjusting the angular disposition of the plate cylinder, a dividing disc 42 is keyed on the shaft 29 and has a plurality of circumferential rows each including a plurality of openings 43 which differ in number from the openings in the other rows. FIGURE 9 shows a development of the periphery of the dividing disc and it will be observed that there are five rows of holes spaced apart longitudinally of the disc and having, respectively, four, six, eight, ten and twelve holes. The holes in each row are equi-distantly spaced apart so that, for example, the holes in the row containing four holes are spaced apart

at angles of ninety degrees, while the holes in the row containing ten holes are spaced apart at angles of thirty-six degrees. This is best illustrated in FIGURE 9.

For holding the dividing disc and the plate cylinder in the adjusted positions, a locking lever 44 has one end connected to a shaft 45 and carries a locking pin 46 to enter any one of the holes 43. The locking lever is adjustable longitudinally of the shaft 45 so that the pin 46 may be inserted in the holes of the desired row, a thumb screw 47 being shown for holding the lever in the desired position on the shaft. The shaft preferably extends throughout the length of the machine with its end portions journaled in the respective end portions A and an operating handle lever 48 is connected to the shaft intermediate the ends of the latter and is preferably adjustable longitudinally of the shaft for convenience in locating the lever at a convenient position for operation. As shown, the shaft is square to conveniently hold the locking lever 44 and the handle lever 48 against rotation relatively to the shaft. With this construction, the locking lever 44 can be easily operated by the handle lever 48 to move the locking pin 46 into and out of the dividing disc holes 43.

After the printing plate has been applied to the plate cylinder, a proof impression of the printing plate is taken on the impression cylinder G, the cylinder first having had applied to its periphery a sheet of suitable material to take the impressions, and the printing portions of the printing plate having been suitably inked. The impression cylinder G is shown as mounted on a shaft 49 journaled in bearing blocks 50 which have tongue and undercut groove sliding connections 51 with the frame end pieces A. The axis of the shaft 49 is disposed parallel to and in a common plane with the axis of the plate cylinder mounted in the pillow blocks C, and the bearing blocks 50 are moved simultaneously on the frame to move the impression cylinder into and out of contact with the plate cylinder. As shown, a screw 52 is threaded in each of the bearing blocks and is journaled in a bracket 53 that is mounted on and extends upwardly from the corresponding end piece A; and also projecting from the bracket 53 are sub-brackets 54 in which are journaled an actuating shaft 55, one end of which has a hand wheel 56 thereon. This actuating shaft has a helical gear connection 57 of known construction with the corresponding screw 52 so that upon rotation of the hand wheel 56, both bearing blocks will be moved simultaneously and the same distance.

When the impression cylinder is moved into contact with the plate cylinder, the two cylinders are geared together, and as shown, a gear 58 which is rigidly connected to one end of the shaft 49 of the impression cylinder coacts with a pinion 59 on the chuck shaft 29. Thus, when the gear 58 and the pin 159 are in mesh, and the plate cylinder is driven by the motor 34, the impression cylinder is also driven. The ratio of the gear 58 and pin 159 may be changed, depending upon the diameters of the two cylinders, and the invention also contemplates an easy and quick means for changing the pinion 59. This means H is shown in detail in FIGURES 11-13 wherein the pinion 59 has a keyway 60 in which is disposed a key 61 that is secured to the shaft 29 in a groove 29a by a screw 62. The key 61 has a beveled outer end 63 with which coacts the beveled end 64 of a locking key 65, the outer end of which projects beyond the end of the shaft 29. A clamping cap 66 has a reduced cylindrical portion 67 removably fitted into a correspondingly shaped socket 68 in the end of the shaft, and the head of the clamping cap abuts the locking key 65. A headed screw locking 69 passes through an opening 70 in the clamping cap and has a screw-threaded connection with the shaft as indicated at 71, for locking the clamping cap in normal position. As shown, the head of the screw has a polygonal socket 72 to coact with a wrench for rotating the screw.

With this construction, the locking key and the clamping cap 66 rigidly lock the pinion on the shaft so that

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there is a minimum of possibility of any lost motion between the pinion and the shaft that might affect the accuracy of the transmission from the printing plate to the impression cylinder, and by simply loosening the locking screw 69 the locking key 65 is sufficiently loosened to permit the pinion to be quickly pulled off the shaft and the placing of another pinion on the shaft. Tightening of the screw 69 easily and quickly rigidly connects the pinion to the shaft.

Similar means generally designated I is provided for changing the gear 58.

While the invention has been shown as embodying certain structural details, it will be understood that this is primarily for the purpose of illustrating the principles of the invention and the details of construction of the machine may be widely modified within the spirit and scope of the invention.

I claim:

1. A machine for mounting and proofing printing plates comprising a main frame, a pair of pillow blocks mounted on the top of said frame and having axially and horizontally aligned shaft bearing seats each to rotatably receive one end of the shaft of a plate cylinder, a printing plate aligning mechanism including a vertical transparent rest sheet for a printing plate, a support strip to be separably attached to the upper edge of a flexible printing plate, a vertical holder for said support strip and said transparent rest sheet, and means mounting the holder on the top of the frame at one side of the common axis of said bearing seats including a base bar movable horizontally on the top of the frame toward and from the common axis of said bearing seats and on which said holder is mounted for movement longitudinally of said axis, said support strip and said vertical holder having coacting portions for magnetically slidably mounting said support strip on said vertical holder, whereby a printing plate may be suspended from said support strip between said rest plate and a plate cylinder mounted on said pillow blocks for alignment of the printing plate with and application to said plate cylinder.

2. A machine as defined in claim 1 wherein said rest sheet for the printing plate is inclined upwardly from the main frame and away from the axis of said pillow block bearing seats.

3. A machine as defined in claim 1 with the addition of an impression cylinder having a shaft, journal blocks in which said impression cylinder shaft is rotatably mounted with its axis parallel to the axes of said bearing seats for the plate cylinder, and means mounting said journal blocks on the frame for movement toward and from said pillow blocks to dispose the impression cylinder in peripheral contact with a plate cylinder supported by said pillow blocks, driving means for said plate cylinder including a pinion and means for connecting said pinion coaxially to a plate cylinder, and a gear rigidly connected to the shaft of said impression cylinder and movable into mesh with said pinion when said journal blocks are moved toward said pillow blocks to dispose the impression cylinder in contact with the plate cylinder.

4. A machine as defined in claim 1 wherein said vertical holder comprises a base piece and two spaced apart vertical end pieces between which said rest sheet is mounted, there are permanent magnets mounted on said end pieces, and said support strip is formed of magnetic material.

5. A machine as defined in claim 1 wherein said vertical holder for the printing plate comprises a base piece and two vertical end pieces on which said support strip is mounted, and the means for mounting said vertical holder on the frame includes said base bar disposed approximately parallel to the axis of said pillow block bearing seats, a pinion and rack connection between the ends of said base bar and said frame for causing said base bar to move in a straight line in parallelism to said axis of said pillow block bearing seats, means slidably mounting

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said base piece of the vertical holder on said base bar for sliding movement longitudinally of the base bar, and means for locking said vertical holder in adjusted position on said base bar.

6. A machine as defined in claim 4 wherein said base bar has a flat front face and with the addition of a ruler gauge longitudinally slidably adjustable on said front face of the base bar, and a transparent sight plate mounted on said vertical holder with a portion thereof overlying said ruler gauge for indicating the position of said vertical holder with respect to the length of a plate cylinder on said pillow blocks.

7. A machine as defined in claim 1 with the addition of an impression cylinder having a shaft, journal blocks in which the shaft of said impression cylinder is rotatably mounted with its axis parallel to the axes of said bearing seats for the plate cylinder, and means for moving said journal blocks toward and from said pillow blocks to dispose the impression cylinder in peripheral contact with a plate cylinder supported by said pillow blocks, driving means for a plate cylinder comprising a chuck having a shaft journaled on said main frame with its axis in alignment with the axis of said bearing seats of the pillow blocks to receive and hold one end of the plate cylinder shaft, a pinion rigidly connected to said chuck shaft, a motor and a driving connection between the motor and said chuck shaft, and a gear on the shaft of said impression cylinder that is moved into mesh with said pinion as said journal blocks are moved to dispose the impression cylinder in contact with the plate cylinder.

8. A machine for mounting and proofing printing plates comprising a main frame, a pair of pillow blocks mounted on said frame and having axially aligned shaft bearing seats each to rotatably receive one end of the shaft of a plate cylinder, a printing plate aligning mechanism including a vertical transparent rest sheet for a printing plate, a support strip to be separably attached to the upper edge of a flexible printing plate, a vertical holder for the support strip at one side of the common axis of said bearing seats, means for mounting a printing plate on said holder in contact with said rest sheet for movement of the plate horizontally and vertically in its own plane, means mounting said vertical holder on said frame for movement horizontally toward and from the common axis of said bearing seats and longitudinally of said axis, whereby a printing plate may be suspended from said support strip between said rest plate and a plate cylinder mounted on said pillow blocks for alignment of the printing plate with and application thereof to said plate cylinder.

9. A machine for mounting and proofing printing plates comprising a main frame, a pair of pillow blocks mounted on said frame and having axially horizontally aligned shaft bearing seats, a plate cylinder journaled in said bearing seats, a printing plate aligning mechanism including a vertical transparent rest sheet for a printing plate inclined upwardly from the main frame and away from the plate cylinder, a support strip to be separably attached to the upper edge of a flexible printing plate, a vertical holder for the support strip at one side of said plate cylinder, means for mounting a printing plate on said holder in contact with said rest sheet for movement of the plate horizontally and vertically in its own plane, means mounting said vertical holder on said frame for movement horizontally toward and from the plate cylinder and longitudinally of said cylinder, whereby a printing plate may be suspended from said support strip between said rest plate and said plate cylinder for alignment of the printing plate with and application thereof to said plate cylinder.

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