Dec. 11, 1962 E. F. DICKERSON 3,067,676

PRINTING PRESS

Filed Aug. 9, 1960 2 Sheets-Sheet 1

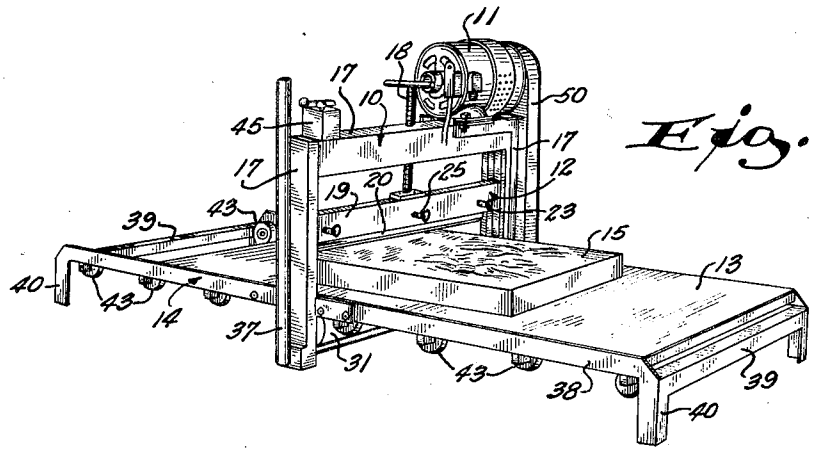


Fig. 1.

Fig. 2.

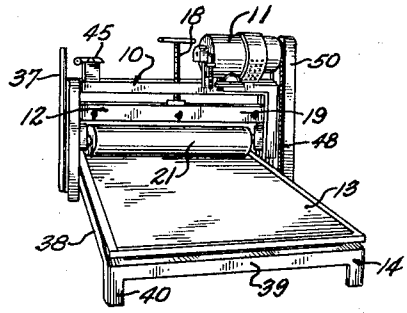


Fig. 3.

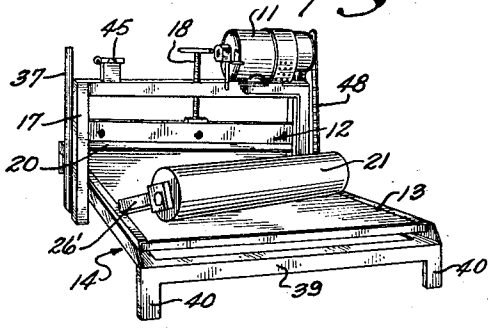


Fig. 4.

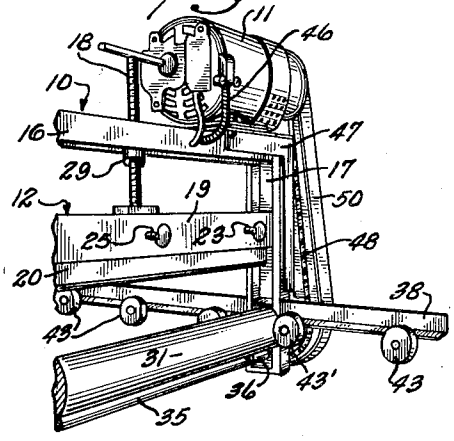
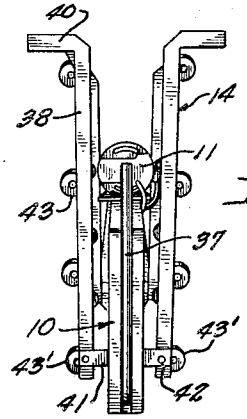


Fig. 5.



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Fig. 6.

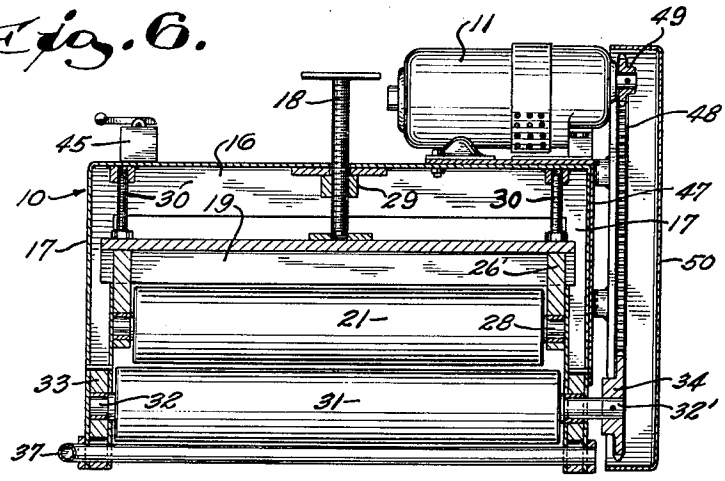
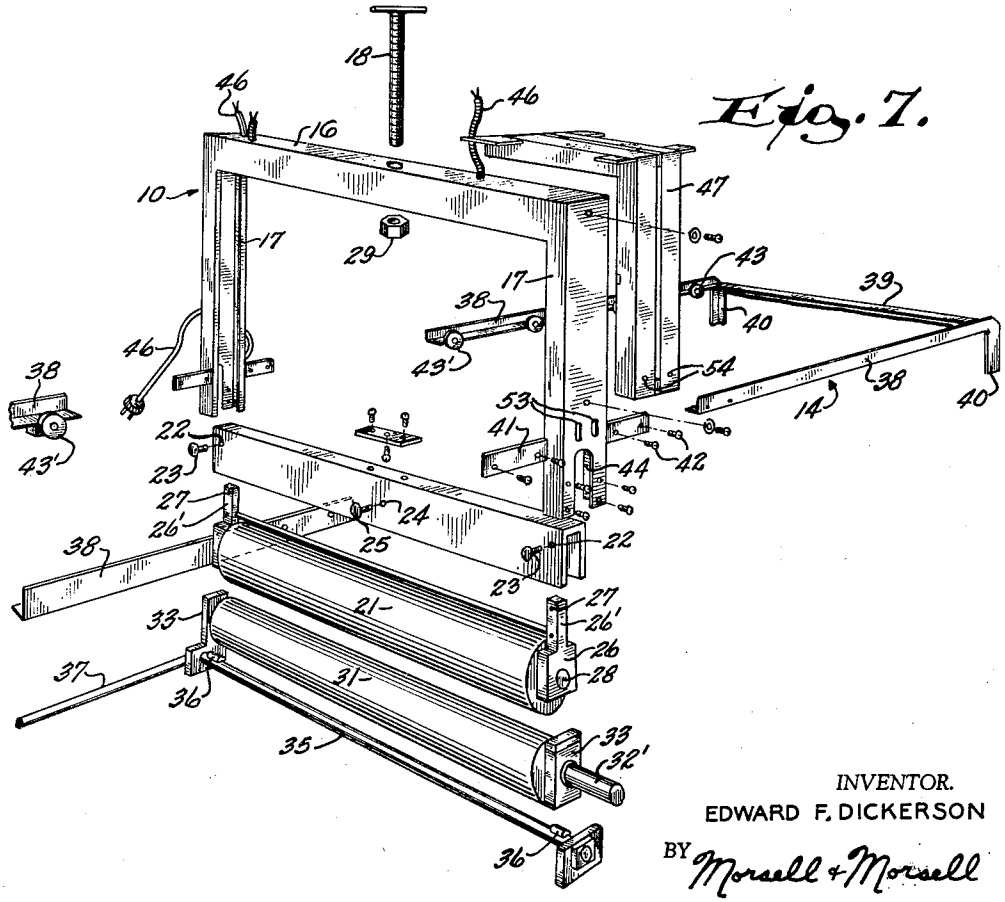


Fig. 7.



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3,067,676

PRINTING PRESS

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6 Claims. (Cl. 101—250)

This invention relates to improvements in printing presses, and more particularly to a combination press designed to perform all three basic printing processes, planographic, intaglio, and relief surface printing.

In planographic printing, or so-called stone lithography, the material to be printed is placed on the surface of a specially treated stone on which the printing or design has been formed, and the reproduction is produced by moving a wooden scraper bar across the surface thereof under pressure. Heretofore a large, cumbersome hand press has been used for this operation. In intaglio, or recessed surface printing, which includes etchings, engravings and drypoints, a metal plate is used in place of a printing stone and a steel roller is driven across the plate to effect the transfer of the design onto the sheet of material. In relief printing, including woodcuts, wood engravings, and linoleum cuts, a roller is also used but a special pressure mechanism is required because of the difference in the form of the work. The result is that three different types of presses are required in order to perform the three common printing processes, and the cost of such separate presses is prohibitive for most individual printmakers, as well as for schools and other institutions working in the graphic arts. With this in mind, it is the principal object of the present invention to provide an inexpensive combination press adapted to perform all three conventional printing operations.

A more specific object of the invention is to provide a press having removable and interchangeable scraper and roller members, and having specially-designed, cooperating pressure and bed adjustment means, whereby all three basic printing operations can be performed on the same press, and wherein quality reproductions can be obtained in all three media.

A further object is to provide a novel printing press which is power driven, thereby minimizing the work of the operator and also enhancing the uniformity of the prints and ensuring quality work by students and other relatively unskilled printmakers.

A further specific object of the invention is to provide a power driven printing press wherein the driving mechanism is in direct contact with the press bed when the machine is in operation, thereby preventing slippage, and wherein the motor mounting and drive assemblage is so designed that the tension on the drive chain is constant no matter what the vertical setting of the bed, thereby eliminating the necessity for complex gear systems such as those employed in conventional etching presses.

A further object is to provide a novel, power driven press wherein the direction of travel of the press bed can be reversed for printing in either direction.

A further object of the invention is to provide a press which is adapted to be mounted on the surface of an ordinary work table, thereby eliminating the need for an elaborate supporting structure, and reducing both the weight of the press and the cost of manufacture.

A further object is to provide a press which is relatively small and lightweight as described, but which press is designed to carry the heaviest printing loads and to print the largest size conventional stones, plates, and blocks.

A further important object of the present invention is to provide a press which can be folded into a compact unit when not in use, in which condition it can be fitted into a convenient, out of the way storage space.

A further object of the invention is to provide a printing press which can be quickly disassembled without special tools or equipment, and in which condition the press can be easily carried by one person.

A further object is to provide a press wherein the pressure unit is suspended from a single point, in contrast to the two point suspension systems characterizing conventional presses, thereby facilitating its adjustment and permitting a certain degree of self-alignment of the roller or scraper bar to compensate for variations or irregularities in the surface of the work.

A further object is to provide a combination printing press which can be used for etchings, as described, which press has special pressure and release means not found on prior etching presses and constituting an improvement over such conventional machines.

A further object is to provide a printing press assemblage as described, wherein the press bed is formed of a lightweight fiberboard material, which is not only substantially less expensive than the heavy oak or steel beds commonly used, but which bed will not warp or bend due to the concentration of pressure in the middle of the bed, as do conventional press beds.

Still further objects of the present invention are to provide a press which is strong and durable, which is simple in operation, and which press is well adapted for its intended purposes.

With the above and other objects in view, the invention consists of the portable combination printing press and all of its components as set forth in the following specification and claims, and all equivalents thereof.

In the accompanying drawings, illustrating the preferred form of the invention, and wherein like reference numerals designate the same parts in all of the views:

FIG. 1 is a perspective view of the complete assemblage in condiiton for use as a lithography press;

FIG. 2 is a perspective view showing the lithography scraper bar replaced by a roller for intaglio or relief printing;

FIG. 3 is another perspective view of the press and showing both the interchangeable scraper bar and roller members;

FIG. 4 is a fragmentary perspective view showing the motor and drive assemblage;

FIG. 5 is a side elevational view of the portable press in its folded condition;

FIG. 6 is a transverse sectional view through the press showing the driving assemblage and rollers, and showing a modification of the pressure regulating mechanism employed in the principal form of the invention; and

FIG. 7 is an exploded, fragmentary perspective view of the press frame.

Referring now more particularly to the drawings, the major structural parts of the improved press comprising the present invention include a vertical central frame **10**, a motor **11**, a pressure unit **12**, a bed **13**, and a bed supporting frame **14**. In the operation of the press, a printing stone **15** having the desired printing or design thereon, or a plate or block of metal, wood, linoleum, or other material, depending upon the type of printing, is first treated and inked and the paper to be printed is superimposed thereon. The stone or other printing member is placed on the press bed and the latter is raised, by means of a cam and lever arrangement which will be described. The pressure unit **12**, which includes either a wooden scraper bar or a metal roller, is then lowered to a point where it will pressurably engage the printing surface, and the motor is actuated to drive the press bed and printing member beneath the pressure unit, the inked design on the printing member being pressed thereby onto the paper. When the printing member has passed completely under the pressure unit the paper is removed and

replaced with a fresh piece, and the operation is repeated as many times as necessary for the desired number of copies.

As is best shown in FIG. 7, the central frame **10** includes a horizontal top bar **16**, having a vertical bore therethrough to receive the shank portion of an elongated vertical adjustment bolt **18**, and a pair of channel shaped side members **17**, said side members opening inwardly to slidably receive the pressure unit **12**, as will be described. In the preferred form of the invention, said frame **10**, like the other members not specifically described hereinafter as being formed of another material, is formed of welded steel, which has the same strength capabilities but is many times lighter than the cast iron pieces used in conventional machines.

The pressure unit **12** employed in the present structure includes a housing or holder **19** having a longitudinal opening in its bottom surface, and is designed to receive, interchangeably, ether a lithography scraper bar, such as the bar **20** shown in FIGS. 1, 3 and 4, or a roller **21** as shown in FIGS. 2, 3, 6 and 7. As illustrated in FIG. 7, said holder is provided with end apertures **22** and a central aperture **24** through which retaining screws **23** and **25** may be projected, respectively, to removably lock said bar or roller therein.

The scraper bar **20** is conventional in general design and construction, being formed of wood and having a beveled lower edge, and is adapted to fit within the holder **19** with its lower, beveled edge projecting therebelow. Said scraper is designed solely for use in planographic printing, of course, while the roller **21**, which is also adapted to be removably mounted within the holder **19**, is intended for use in either intaglio or relief printing. The latter member is formed of lathe-turned, high grade steel, and has end supporting blocks **26** in which the ends of the roller shaft **28** are journaled, said bearing blocks having upwardly-projecting extensions **26'** adapted to be inserted into the holder **19**. As shown in FIG. 7, said block extensions have openings **27** into which the aforementioned retaining screws **23** may be projected to removably secure said roller in position.

As will be readily appreciated, the design of the housing or holder **19** permits the interchangeable use of said roller and scraper members, depending upon the intended function of the press. Moreover, the simple mounting assemblage permits said interchangeable pressure members to be attached or removed quickly and without requiring special tools or equipment.

As shown in FIG. 6, the entire pressure unit, including the holder **19** and either the roller **21** or scraper bar **20**, is suspended from the central frame by means of an elongated adjustment bolt **18** which projects vertically through the frame top member **16** as hereinabove described. The lower end of said adjustment bolt is permanently rotatably secured to the top of the holder, and the shank portion of said bolt is threaded through a nut **29** welded or otherwise rigidly secured to the underside of the frame top bar **16**. The result is that when the adjustment bolt **18** is turned, it either raises or lowers the pressure unit. The use of such a suspension arrangement allows for quick and perfect adjustment of the printing pressure, or proximity of the roller or scraper to the printed surface, and is a decided improvement over conventional presses wherein two adjustment screws, one at each end, must be independently turned and set. With th present one-point suspension system, in addition, the roller or scraper bar can pivot slightly within the central frame and will not only automatically adjust itself to perfect parallel contact with the printing surface, but will yield temporarily to compensate for any irregularities in the surface of the stone or other printing member.

A further advantage of the pressure unit suspension arrangement characterizing the present invention is that the adjustment bolt is attached to the unit, rather than merely positioned thereabove and adapted to bear downwardly against the top of the holder, as in most conventional presses. The resulting positive suspension of the pressure unit eliminates the possibility of the roller dropping down onto the bed after the plate has passed thereunder, and also eliminates the problem of excess pressure at the beginning and end of a print, which occurs with conventional presses wherein the plate has to force the roller up to its adjustment screws.

In the modified form of the invention shown in FIG. 6, in addition to the central adjustment bolt **18**, bolts **30** are provided at the ends of the pressure unit, said bolts being adapted to permit additional downward pressure to be applied to either end of the holder independently, if desired. It is to be understood that said bolts **30** are not critical to the operation of the press, however, and the invention is not to be limited to the construction illustrated in FIG. 6.

The lowermost portion of the central frame assemblage includes a drive roller **31** which is designed to drivingly engage the underside of the press bed, and which is operatively associated with the motor **11**, as will be described. Said driving roller is formed of high-grade steel, and has a longitudinal shaft **32** journaled in end bearing blocks **33** which are vertically-slidably carried within the frame side members **17**, one end **32'** of said shaft projecting outwardly beyond its block mounting and having a sprocket **34** thereon. Rotatably mounted beneath and parallel to the roller is a rod **35** having a plurality of cams **36** thereon (FIG. 7) adapted to engage and raise the roller when the rod is turned to a certain position. The upward movement of the roller is permitted through the slidable nature of its end blocks with the frame side members, as described, and a vertical cutout **44** (FIG. 7) is provided in one of said side members to permit upward travel of the roller shaft extension **32'**.

To facilitate the turning of the rod **35**, to move the cams thereon into and out of engagement with the roller, an elongated lever handle **37** is provided at one end thereof, said handle being in a vertical position in alignment with the frame side member when the cams are not in engagement with the roller, and being positioned horizontally when the cams are engaged with said roller. The function of said adjustment mechanism, as will be more fully described, is to permit the drive roller to be raised to a position where it drivingly engages the underside of the press bed, or lowered to a position spaced below and out of engagement with said press bed.

Referring now to the bed and bed-supporting framework, it will be seen in FIG. 7 that the frame **14** includes two separable sections, each comprising a pair of parallel side rails **38** which are L-shaped in cross section, an end connecting bar **39**, and having supporting legs **40** at its outer corners. Each of the frame side rails **38** is designed to be removably secured at its inner end to a short, horizontal wing or arm **41** projecting transversely from the lower portion of the central frame, a few inches above the lower end thereof, by means of pairs of screws **42**. As will be appreciated, when both of the screws **42** retaining the inner end of each of said side rails are inserted therethrough the rails are locked against undesired movement, but when one of said screws is removed from each side the section can be swung upwardly to a vertical position adjacent and parallel with the central frame, as shown in FIG. 5. This feature permits the entire assemblage to be folded up into a compact unit for transportation or storage, as will be described.

The side rail members **38** of said bed-supporting frame **14** are L-shaped in cross section, as mentioned, and the vertical legs thereof are adapted to provide guide means to prevent the bed from moving off said rails during the operation of the press. Spaced along said rails **38** are a plurality of rubber wheels **43** which are designed to facilitate the movement of the press bed under the influence of the driving roller **31**.

The press bed **13** is rectangular in shape, and is formed

of a high-density fiberboard material such as masonite, or the like. Such material is substantially lighter than the solid steel or oak beds used in conventional presses, enhancing the portability of the press and, in addition, because of the resiliency of the material, the bed will not warp due to the concentration of pressure in the middle of the bed, as do conventional press beds. Moreover, of course, such fiberboard beds are comparatively inexpensive both to manufacture and to replace.

The electric motor **11** used in the preferred form of the invention is a reversible, constant speed, 110 volt alternating current motor, and is vertically-adjustably mounted on the central frame, there being a switch **45** conveniently located on said frame, and wiring **46** connecting the switch and motor to a source of electricity. The motor mounting bracket **47** is inverted L-shaped in form, the upper, horizontal leg normally resting on the surface of said frame top member **16**, and the vertical leg depending therefrom adjacent and slidably associated with the frame side member, said bracket leg being connected at its lower end to the adjacent drive roller bearing block **33**.

As mentioned, the outer end **32'** of the drive roller shaft has a sprocket **34** thereon, and as will be seen in FIG. 6, a chain **48** is trained about said sprocket and about a sprocket **49** rigidly mounted on the motor drive shaft, thereby drivably connecting the roller **31** to said motor, and providing the means for actuating the press bed. A removable cover **50** is secured over the drive chain **48** to enhance the appearance of the press and to eliminate the possibility of injury to the operator.

Due to the fact that the lower end of the motor mounting bracket **47** is connected to the drive roller bearing block **33**, and inasmuch as the bracket is movable relative to the central frame as described, upward movement of the drive roller, in response to a turning of the adjustment rod **35**, causes a simultaneous and equal upward movement of the bracket and motor assemblage. The result is that the tension on the drive chain **48** is always constant, no matter what the position of the lower roller, thereby eliminating slack and insuring an absolutely constant bed speed.

In conventional etching presses the upper roller is the driving roller, and with such presses a complex planetary gear system is necessary so that the roller can be driven when it is raised above its normal operating position, as is frequently necessary in order to accommodate different sized stones or printing plates. With the present arrangement, on the other hand, wherein the drive roller is positioned beneath the bed, such supplementary gear devices are unnecessary. A further advantage of the present drive roller arrangement is that with the drive roller mounted beneath the bed any torsion developed over the length of the roller is not transmitted to the work, as happens in upper roller driven presses. Moreover, with such conventional etching presses the upper roller frequently engages and pulls the paper or printing member along the surface of the bed without moving the bed, which is impossible with the present invention wherein the roller is in direct contact with the undersurface of the bed and there is no chance for slippage.

In the use of the press for planographic printing, or stone lithography, the wooden scraper bar **20** is inserted into the holder **19** and secured therein by the central retaining screw **25**. The press bed is then raised, through the lever handle **37** and coacting cams **36** which raise the lower roller, which, in turn, raises said bed. The lithographic stone on which the design is formed, and which has been treated and inked in the conventional manner, is placed on the bed with the printing paper positioned on the top surface thereof. The scraper bar is then lowered by means of the central adjustment bolt **18** to a position where it will engage the surface of the stone with the desired amount of pressure, and the motor is switched on. The motor drives the lower roller **31**, through the chain connection **48**, and said roller frictionally engages the underside of the press bed and moves the same longitudinally along the frame side rails **38**. After the paper has passed beneath the scraper and the inked design has been impressed thereon, the bed and drive roller are lowered, through the lever **37**, to permit the removal of the paper.

As will be seen in FIG. 4, when the drive roller **31** is in its raised or operative position, being engaged by the cams **36** on the rod **35**, said roller is slightly above the top level of the guide wheels **43**, the press bed actually traveling slightly upwardly until half its length passes over said roller, and then slightly downwardly. When the roller is lowered, to disengage the same from the bed, it drops slightly below the top of said guide wheels. Consequently, when the roller is lowered, two things occur. First, of course, the roller is no longer in driving engagement with the press bed, and secondly, the portion of the bed directly under the scraper bar or roller drops slightly from its original position above the top level of the guide wheels **43** to a position where it rests directly on said wheels. The result is that when the drive roller is lowered not only is the movement of the bed stopped, but the bed also drops to a position spaced below the pressure member, thereby allowing the work to be easily withdrawn from under said member.

When the press is to be used for intaglio printing, or etchings, it is merely necessary to remove the lithography scraper bar from the holder **19**, and to replace the same with a steel roller. For the latter media a plate or block is used in place of the printing stone employed in lithography, but the operational procedures are otherwise very similar.

In conventional etching presses, the work is driven completely past the upper roller to permit the removal of the paper, and frequently there is considerable difficulty in starting the felts and work under the roller on the next pass through. With the present invention, on the other hand, where the press bed is lowered to permit withdrawal of the work, this difficulty is eliminated.

As hereinbefore described, when the press is not in use it can be easily taken apart or folded up into a compact unit so that it can be stored in a small, convenient space, or can be carried from place to place. In this respect, when either or both of the frame sections **14** are swung to a position parallel with the central frame **10** (FIG. 5), which can be accomplished after removing one of the retaining screws **42** on each side, the press can be tipped so that it rests on one of the innermost pairs of guide wheels **43'**, and that in this position, and using two of the legs **40** as handles, the press can be easily wheeled about by one person.

From the foregoing, it will be seen that the novel press comprising the present invention provides many advantageous features not found in conventional press structures. Moreover, the present machine is adapted to perform all three basic printing operations, planographic, intaglio, and relief printing, and eliminates the necessity for three separate, relatively expensive presses.

It is to be understood, of course, that the improved combination press hereinabove described is not to be limited or confined to the exact structural details illustrated. Obvious changes or modifications in many of the individual components will undoubtedly suggest themselves to persons skilled in the art, and all of such changes or modifications are contemplated which do not depart from the spirit of the invention and which may come within the scope of the following claims.

What I claim is:

1. A printing press comprising: a main frame having a pair of upright side members and a horizontal top bar supported by and between said side members; a pressure member removably and vertically-adjustably carried by and between said frame side members; means for raising and lowering said pressure member; a drive member vertically-movably carried between said main frame side mem-

bers below said pressure member; a motor vertically-movably mounted on said main frame and operatively connected to a source of power; means operatively connecting said motor to the drive member; mounting means for said motor and drive member permitting the same to be raised and lowered conjointly; and a flat bed horizontally-movably mounted below said pressure member, said bed being so positioned that it is spaced above said drive member when the latter is in a lowered position, but whereby the bed underside is engaged by said drive member when the latter is in a raised position.

2. A printing press comprising: a main frame having a pair of upright side members and a horizontal top bar supported by and between said side members; an elongated pressure member mounted between said side members below said top bar; means connected to and depending from said top bar vertically-adjustably supporting said pressure member intermediate its length, said supporting means permitting said pressure member to cant; a drive member vertically-movably carried by and between said frame side members below said pressure member; a motor vertically-movably mounted on said main frame and operatively connected to a source of power; means operatively connecting said motor to the drive member; mounting means for said motor and drive member permitting the same to be raised and lowered conjointly; and a flat bed horizontally-movably mounted below said pressure member, said bed being so positioned that it is spaced above said drive member when the latter is in a lowered position, but whereby said bed is engaged by said drive member when the latter is in a raised position.

3. A printing press comprising: a main frame having a pair of upright side members and a horizontal top bar supported by and between said side members; a holder verticaly-movably carried by and between said frame side members; a pressure member removably mounted in said holder; a vertical adjustment member carried by said top bar intermediate its length secured to and vertically-adjustably supporting said holder intermediate its length; a drive member vertically-movably carried by and between said main frame side members below and parallel with said holder; a motor vertically-movably mounted on said main frame and operatively connected to a source of power; means operatively connecting said motor to the drive member; mounting means for said motor and drive member permitting the same to be raised and lowered conjointly; a transverse bed-supporting frame comprising a pair of aligned sections having parallel side rails pivotally attached to said main frame side members, said bed-supporting frame sections being pivotal from a normal, horizontal position to an upright position parallel with and adjacent said main frame side members; guide members on said bed-supporting frame side rails, the top plane of said guide members being slightly below the uppermost point of the drive member when the latter is in its raised position and slightly above said drive member when the same is lowered; and a horizontal bed movably carried on said guide members.

4. A printing press comprising: a main frame having a pair of upright side members and a horizontal top bar supported by and between said side members; a holder vertically-movably carried by and between said frame side members; a pressure member removably mounted in said holder; a vertical adjustment member carried by said top bar intermediate its length secured to and vertically-adjustably supporting said holder intermediate its length; a drive member vertically-movably carried by and between said frame side members below said holder; a motor vertically-movably mounted on said frame and operatively connected to a source of power; means operatively connecting said motor to the drive member; mounting means for said motor and drive member permitting the same to be raised and lowered conjointly; a transverse bed-supporting frame having a pair of parallel, horizontal side rails; guide members on said bed-supporting frame side rails, the top plane of said guide members being slightly below the uppermost point of the drive member when the latter is in its raised position and slightly above said drive member when the same is lowered; and a horizontal bed movably carried on said guide members.

5. A printing press comprising; a central frame having a pair of vertical side members and a horizontal top bar, said top bar having a transverse threaded bore therethrough intermediate its length; a holder slidably carried by and between said frame side members; a pressure member mounted in said holder; an adjustment bolt threaded through said top member bore and rotatably secured to and supporting said holder intermediate its length; a drive roller slidably carried by and between said central frame side members below and parallel with said holder; means for raising and lowering said drive roller; a reversible motor vertically-movably mounted on said central frame and operatively connected to a source of power; means operatively connecting the drive roller to said motor; means connecting said motor and said drive roller and permitting said members to be raised and lowered conjointly; a bed-supporting frame comprising a pair of aligned sections, each having parallel side rails removably attached at their inner ends to said central frame, said frame sections being so attached to said central frame that they can be swung to a position parallel with and adjacent said central frame; a plurality of guide members mounted in spaced relation along said bed-supporting frame side rails, the top plane of said guide members being slightly below the uppermost point of the drive roller when the latter is in its raised position and slightly above said roller when the same is lowered; and a bed movably mounted on said guide members.

6. A printing press comprising: a central frame having a pair of vertical, channel-shaped, inwardly opening side members, and said central frame having a horizontal top bar having a vertical, threaded bore therethrough intermediate its length; a horizontal holder slidably carried within and between said central frame side members, said holder having a longitudinal opening in its bottom surface, and said holder being adapted to receive and retain a pressure member; an adjustment bolt threaded through said top member bore and rotatably secured to and supporting said holder intermediate its length; a drive roller slidably mounted within and extending between said central frame side members below and parallel with said holder; a plurality of cams mounted beneath said drive roller and adapted to raise and lower the same; a motor mounting bracket vertically movably mounted on said central frame; means connecting said bracket to said drive roller, and permitting said members to be raised and lowered conjointly; a motor mounted on said bracket and connected to a source of power; means operatively connecting the drive roller to said motor; a bed-supporting frame comprising a pair of aligned sections, each having parallel side rails removably attached at their inner ends to said central frame in a manner whereby said frame sections can be swung to positions parallel with and adjacent said central frame; a plurality of guide wheels mounted on said bed-supporting frame side rails, the top plane of said guide wheels being slightly below the uppermost point of the drive roller when said roller is in its raised position and slightly above said roller when the same is lowered; and a flat bed longitudinally movably mounted on said guide wheels, whereby when the drive roller is in its raised position it frictionally engages the underside of said bed to drive the same beneath said holder, and when said drive roller is in a lowered position it is spaced below said bed and out of engagement therewith.

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