

Oct. 27, 1931.

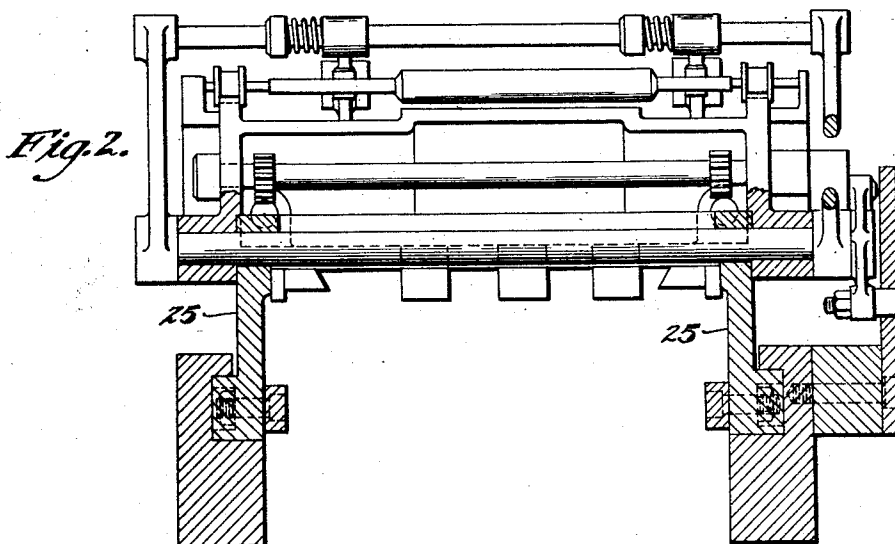
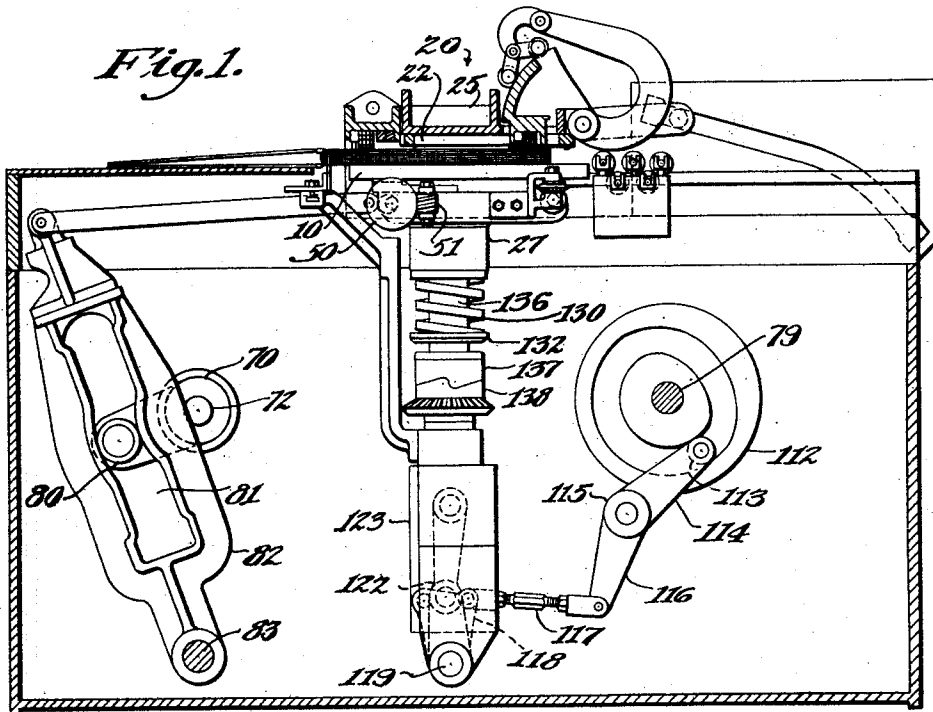
S. R. HOWARD

1,829,004

PRINTING PRESS

Filed Feb. 20, 1930

5 Sheets-Sheet 1



INVENTOR
Stanley P. Howard
BY J. Stanley Churchill.
ATTORNEY

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S. R. HOWARD

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5 Sheets-Sheet 2

Fig. 3.

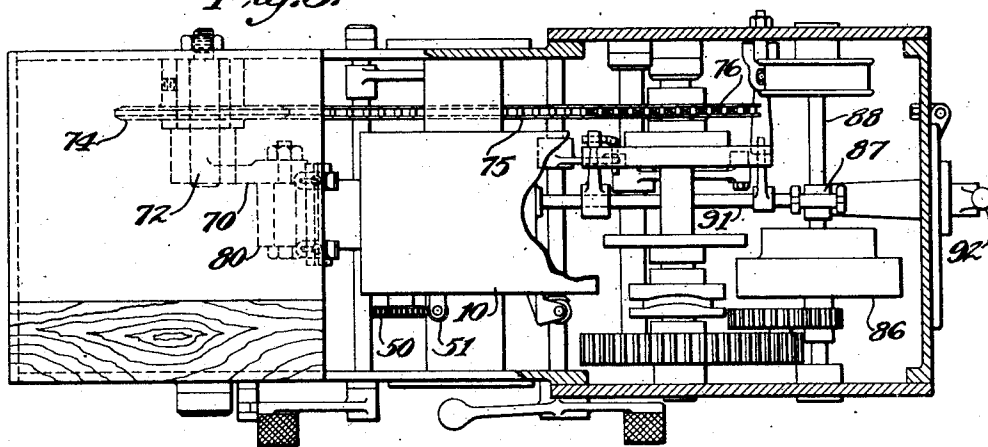
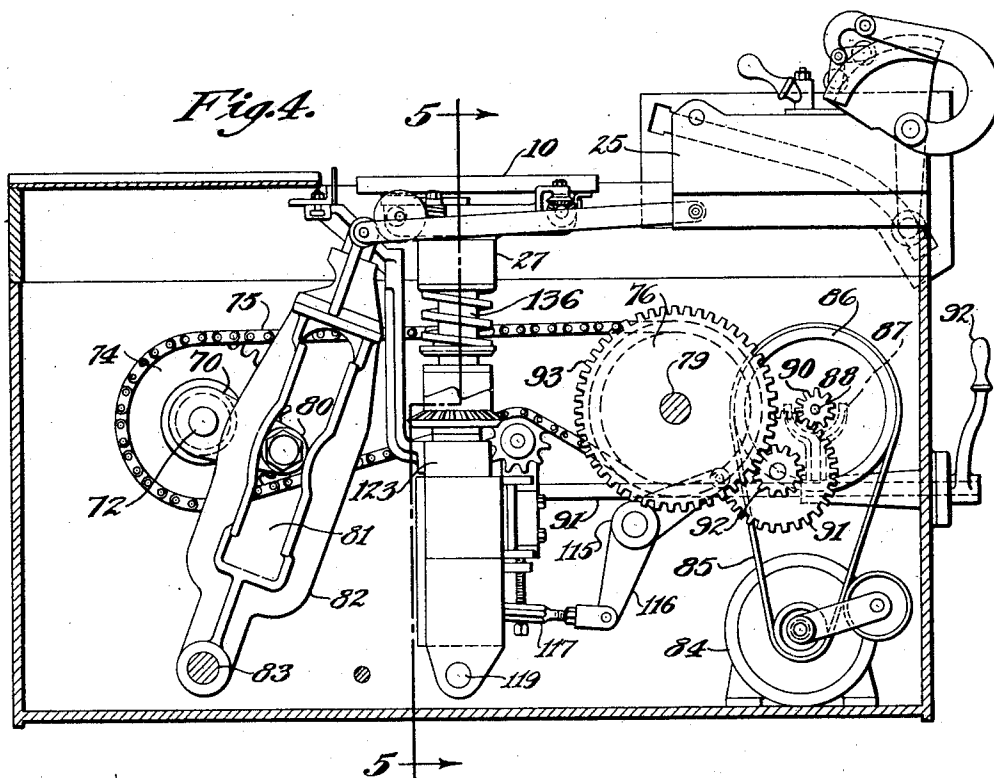


Fig. 4.



INVENTOR
BY *Stanley G. Howard*
J. Stanley Churchill.
ATTORNEY

Oct. 27, 1931.

S. R. HOWARD

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5 Sheets-Sheet 3

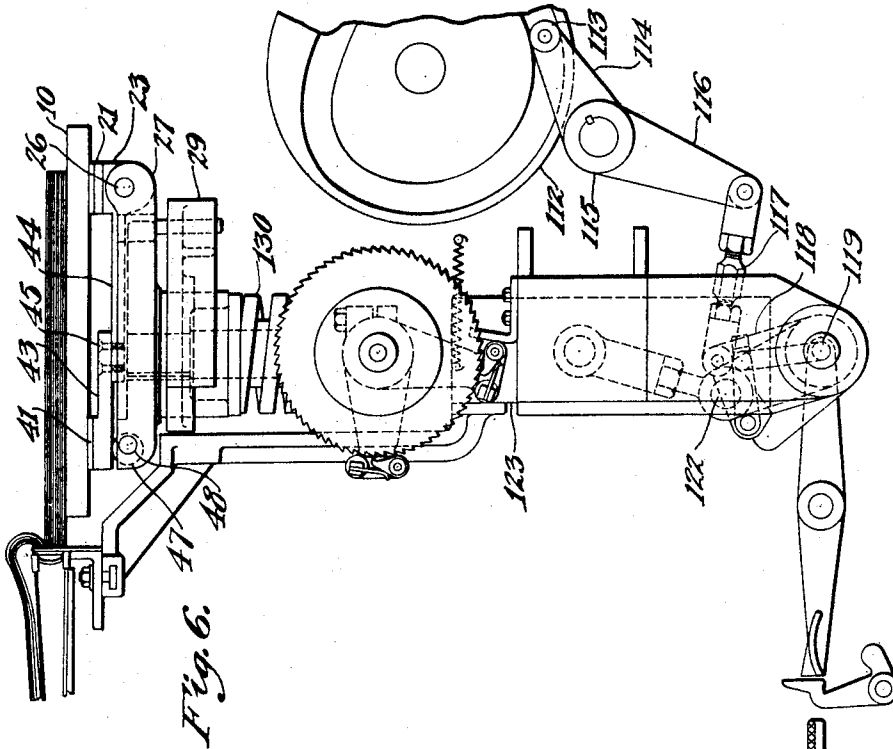


Fig. 6.

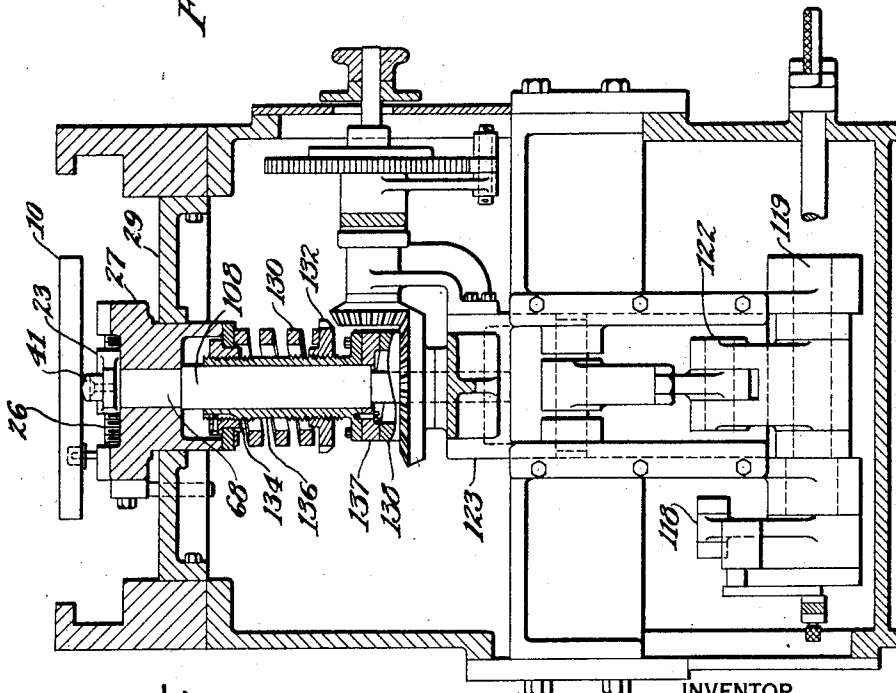


Fig. 5.

INVENTOR
BY *Stanley P. Howard*
J. Stanley Churchill
ATTORNEY

Oct. 27, 1931.

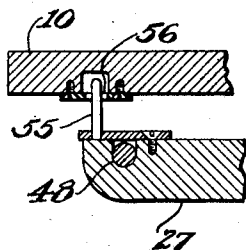
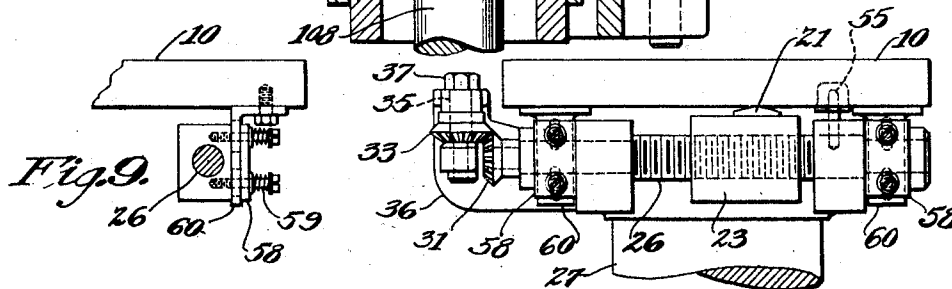
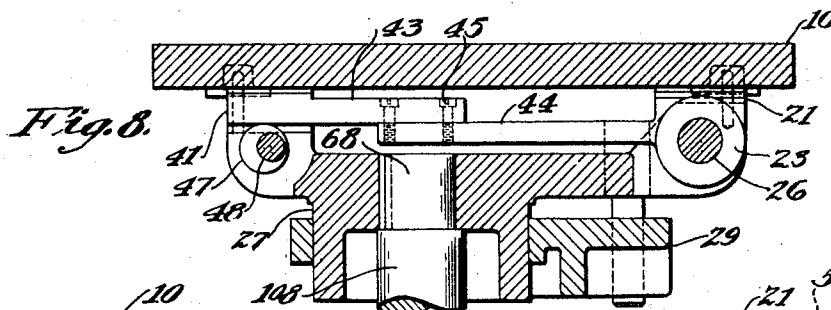
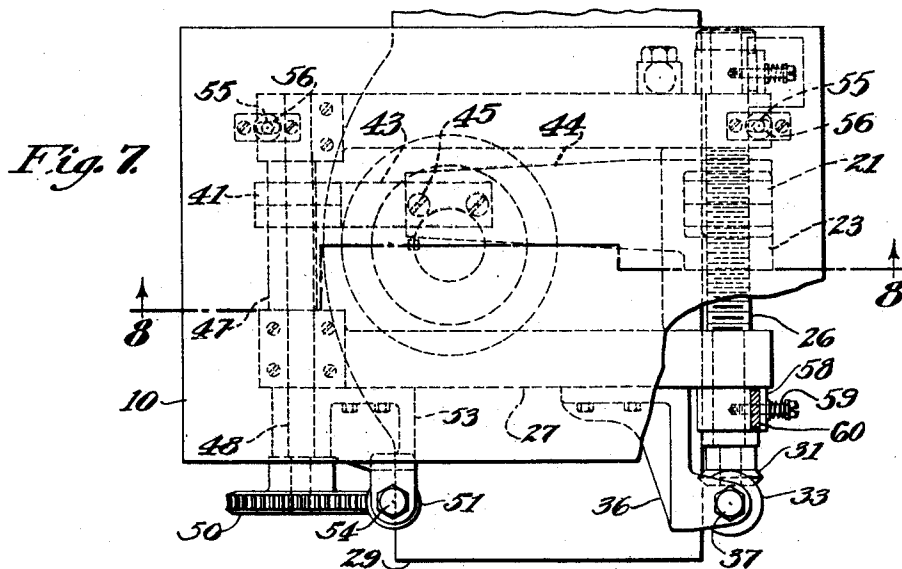
S. R. HOWARD

1,829,004

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5 Sheets-Sheet 4



INVENTOR
BY *Stanley F. Howard*
J. Stanley Churchill
ATTORNEY

Oct. 27, 1931.

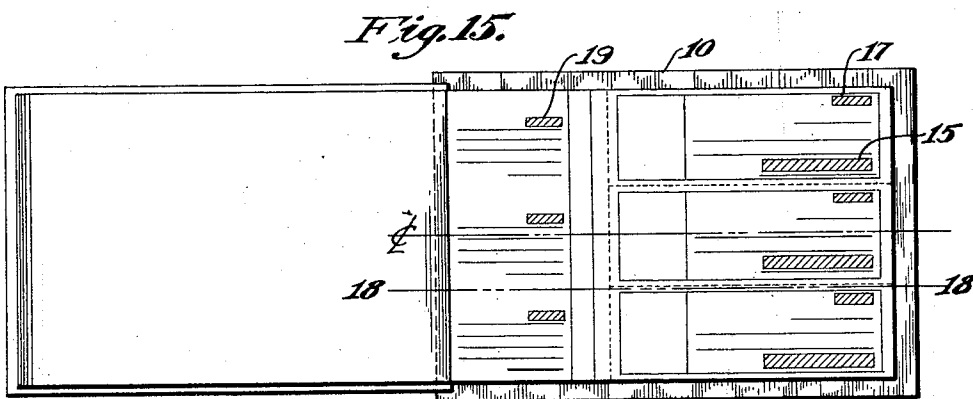
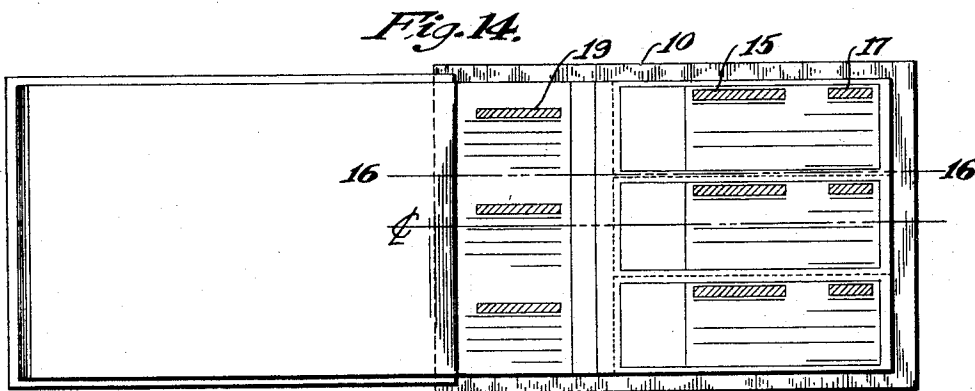
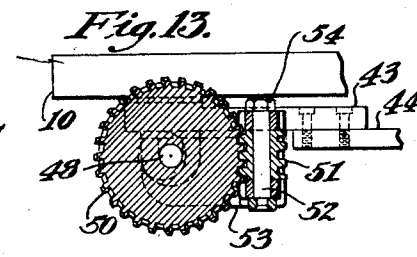
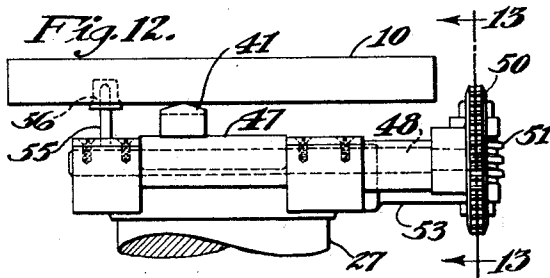
S. R. HOWARD

1,829,004

PRINTING PRESS

Filed Feb. 20, 1930

5 Sheets-Sheet 5



INVENTOR

BY *Stanley F. Howard*
J. Stanley Churchill
ATTORNEY

UNITED STATES PATENT OFFICE

STANLEY R. HOWARD, OF EAST MILTON, MASSACHUSETTS, ASSIGNOR TO PNEUMATIC SCALE CORPORATION, LIMITED, OF QUINCY, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS

PRINTING PRESS

Application filed February 20, 1930. Serial No. 430,012.

This invention relates to a printing press. In general the object of the invention is to provide a novel and improved printing press which is capable of performing the printing operation more efficiently and more uniformly upon certain characters of work than other presses of which I am aware.

A further object of the invention is to provide a novel and improved press for printing upon the uppermost sheet of a pile and particularly upon the uppermost leaf or page of the body portion of a book, and in which provision is made for enabling different parts of the surface being printed upon to be impressed with substantially uniform pressure during the printing operation irrespective of inequalities in the distribution of the printing over the surface of the page.

A still further object of the invention is to provide a novel printing press, which is particularly designed for printing upon the uppermost sheet of a pile, such as upon the uppermost leaf or page of the body of a book, and in which provision is made for compensating for the cumulative effect of variations in the thickness of the individual sheets making up the pile and also for compensating for inequalities in the distribution of the printing over the surface, to the end that printing impressions of substantially uniform intensity may be produced on the different parts of the surface of the work.

These and other features of the invention will be hereinafter described and particularly defined in the claims at the end of this specification.

In the drawings illustrating the preferred embodiment of the invention, Fig. 1 is a longitudinal vertical section through the improved printing press; Fig. 2 is a cross-sectional detail illustrating the inking mechanism; Fig. 3 is a plan of the improved machine with portions in section; Fig. 4 is a longitudinal section illustrating the mechanism for actuating the carriage containing the printing element; Fig. 5 is a cross-sectional view on the line 5—5 of Fig. 4; Fig. 6 is a detail in side elevation of the work supporting platen and associated operating mechanism; Fig. 7 is a plan with a portion

broken away of the improved work supporting platen and adjusting mechanism therefor; Fig. 8 is a cross-sectional view on the line 8—8 of Fig. 7; Fig. 9 is a detail illustrative of the frictional members for the platen; Fig. 10 is an elevation of the right-hand side of the platen shown in Fig. 7; Fig. 11 is a detail illustrating one of the limiting pins to be referred to; Figs. 12 and 13 are details in elevation and section respectively of the platen, its supporting knife edge and the mechanism for varying the position thereof; and Figs. 14 and 15 are views of a check book upon the supporting platen illustrating different distributions of the matter to be printed upon the check book.

In printing upon certain characters of material, particularly upon the uppermost sheet in a pile, it is quite necessary that the work be supported in a non-rigid manner and difficulty has heretofore been experienced under such conditions in obtaining uniformity in the intensity of printing impressions produced in different parts of the surface of the work. For example, in certain types of printing it becomes necessary to print considerably more material on one part of the work than upon another part, and as a result of this inequality in the location or distribution of the printing over the surface of the work it has been found that inequalities result in the character and intensity or depth of the printing performed upon the different portions of the surface of the work. In the present press, provision is made for insuring that the printing pressure be uniform irrespective of such inequalities in the distribution of the printing over the surface of the work. In printing upon the uppermost sheet of a pile, because of the cumulative effect of slight variations in the thickness of the individual sheets making up the pile, provision is made in the present press for permitting the work supporting member to tilt so as to adapt itself to such variations in the thickness of the pile of sheets.

As an example of one character of printing for which the present machine is particularly designed, I may refer to the printing per-

formed upon the successive pages of a bound check book in order to print the customer's name upon the face of each check and in order to print in the serial number of the check upon the check and also upon its stub. It so happens that the location of the customer's name varies considerably in different checks, and it has been found that superior and more uniform printing may be produced in the present machine in which provision is made for counteracting the variations in the location of the printing over the surface of the check book in order to insure substantially uniform printing pressure at each part being printed upon. The illustrated printing press is therefore particularly designed and adapted for use in printing upon the predetermined portions of the pages of a bound book in accordance with the method forming the subject matter of a copending application Serial No. 354,295, filed by Charles E. Gale, and the present machine is an improvement upon the machine forming the subject matter of the copending application Serial No. 425,796 filed by Charles E. Gale, to both of which reference is made by permission. In accordance with such method and in such machine the printing operation is performed upon the uppermost page comprising the body portion of the book, and then such page after having been printed upon is turned to expose the next underlying page in a position ready to be printed upon. During the printing operation the pages making up the body of the book are preferably maintained in predetermined and registered position with relation to the printing element.

The illustrated machine with the exception of the supporting platen and the mechanism by which it is supported in a manner such as to insure the production of uniform printing pressure and consequently of uniform printing at the different portions of the surface of the work irrespective of the inequalities in the distribution of the printing over the surface, may and preferably will comprise the machine illustrated in and forming the subject matter of the above referred to application of Charles E. Gale for such machine Serial No. 425,796, filed February 4, 1930.

In the illustrated machine the work herein shown as a check book is operatively supported during the printing operation upon a platen 10, and the printing operation is performed by raising the platen 10 to press the uppermost page of the book against a printing element 20.

Referring now to Figs. 14 and 15, it will be observed that in the check book illustrated therein the customer's name, represented at 15, and the serial numbers upon the check and the stub respectively, represented at 17 and 19, are so spaced that the center of pressure produced during the printing operation does not coincide with the longitudinal cen-

ter line of the book, and as a result, when the yieldingly supported platen 10 is raised in performing the printing operation, inequalities in the intensity of the printing impression upon opposite sides of the center line have resulted.

In order that the printing pressure may be made uniform irrespective of inequalities in the distribution of the printing, provision is made for supporting the platen 10 along a longitudinal axis and for adjustably moving such supporting axis to cause it to coincide with the center of pressure of the particular work being printed. For example, when the check book illustrated in Fig. 14 is to be printed, the platen 10 may and preferably will be supported upon a supporting member preferably a knife edge positioned underneath the line 16—16 representing the center of pressure produced during the printing operation. In the check book illustrated in Fig. 15, the platen may be supported upon the supporting member or knife edge located underneath the line 18—18 representing the center of pressure for that particular check book.

Referring now more particularly to Figs. 5, 7, 8, 9 and 10, as herein shown the platen 10 is pivotally mounted upon a knife edge or pivot member 21 mounted upon and carried by a block 23, and provision is made for operatively supporting the block 23 in a manner such as to permit it to be readily moved transversely of the platen 10. For this purpose the block is provided with a threaded hole through which a screw 26 extends, and the latter is operatively supported in suitable bearings in a supporting piece 27 slidably mounted in a cross piece 29 forming a part of the framework of the machine, and the supporting piece 27 comprises a part of the plunger upon which the platen is mounted to be lifted to perform the printing operation in the manner previously known, and as set forth in the Gale application above referred to. One end of the threaded rod 26 is connected by beveled gears 31, 33 to a vertical shaft 35 journaled in bearings in a bracket 36 secured to the side of the supporting piece 27, and the threaded rod 26 is arranged to be turned to effect the lateral adjustment of the knife edge, by the operator turning a nut 37 on the upper end of the shaft 35.

In the illustrated machine, as shown in Figs. 7 and 8, the platen 10 is also pivoted upon a second knife edge 41 connected with the first knife edge 21 to be moved laterally therewith as the threaded rod 26 is turned as above described, and the second knife edge 41 is connected by an arm 43 directly to an arm 44 projecting from the block 23, the two arms 43, 44 being secured together by the screws 45 as shown. The arm 43 carrying the second knife edge is supported upon an

eccentric 47 mounted upon a cross shaft 48 journaled in suitable bearings in the supporting piece 27, and provision is made for rotating the eccentric to tilt the platen, and as herein shown by a worm wheel 50 co-operating with a worm 51 fixed on a shaft 52 journaled in suitable bearings in a bracket 53 secured to the supporting piece 27 and having a nut 54 on the upper end of the shaft by which the shaft may be turned.

From the description thus far it will be apparent that the platen 10 being pivoted upon the knife edges 21, 41 is permitted to rock laterally and that the knife edges being connected together by the arms 43, 44 enable the platen to be tilted in a longitudinal direction or about a transverse axis as the eccentric 47 is raised or lowered. In order to stabilize the position of the platen, a limiting pin 55 is provided upstanding from the supporting piece 27, and the top of the pin is loosely received within a slot or a hole 56 in the lower side of the platen 10. Friction members 58 are yieldingly held by springs 59 against a bracket 60 depending from the underside of the platen to control the vertical movements of the platen.

As previously described, the printing press in which the present platen and its supporting mechanism by which the superior printing may be accomplished, are preferably embodied in the printing press forming the subject matter of the application of Charles E. Gale above referred to, and a sufficient portion of such machine has been herein illustrated to enable the present invention to be understood. Reference is made, however, by permission to the above mentioned Gale application Serial No. 425,796, for a complete description of the entire machine, but for the purposes of understanding the present invention, it may be said that the printing element 20 may comprise a chase 22 in which the type may be set in any usual or preferred manner, and the chase 22 is removably secured in a framework or carriage 25 slidably mounted by tongue and groove connections in the side frames of the main frame of the machine to thereby permit the chase to be slid into printing position over the supporting platen 10 at definite intervals in each cycle of the operation of the machine.

Referring now to Figs. 3 and 4, the mechanism for actuating the carriage 25 to slide it into and from operative printing position includes a crank 70 free to turn on the stud 72 and a sprocket 74 attached to the hub of the crank 70. The sprocket 74 is driven by means of a chain 75 from a sprocket 76 on the main shaft 79. The crank 70 is provided with a roll 80 operating in a slot 81 and a lever 82 pivoted upon the pin 83 secured in the main frame of the machine. The main drive shaft 79 is arranged to be driven from a motor 84 through suitable driving mechanism includ-

ing the belt 85, clutch 87 and shaft 88 upon which the clutch pulley 86 is mounted. The shaft 88 is geared to the shaft 79 through a gear train including the pinion 90, gear 91, pinion 92 and gear 93. Provision is made for operating the clutch 87 from an operating handle 92 through the clutch rod 91.

The book supporting platen, having provision as above described for the adjustment of its supporting knife edges laterally with respect to the platen, and also the adjustment of the platen through the eccentric 47 in order to tilt the platen for the purpose above described, is mounted upon the upper end of a main supporting plunger 68 through the supporting piece 27 guided in its movement in a bearing in the cross member 29 as described. The main supporting plunger 108 is arranged to be lifted to raise the platen by an actuating cam 112 on the main shaft of the machine which is driven in timed relation to the mechanism for moving the carriage 25 into and from operative printing position. As herein shown, the movements of the cam 112 are transmitted to a cam roller 113 mounted upon the end of one arm 114 of a bell crank 115, the second arm 116 of which is connected by a link 117 to an actuating lever 118 pivoted upon a countershaft 119 having bearings in brackets bolted to the machine frame. When the cam depresses the cam roller 113, the actuating lever 118 is thrown to the left, and provision is made under the control of the operator for connecting the actuating lever 118 with a toggle 122 to throw the toggle into a straightened position and thereby raise the plunger 68 to lift the platen as above described to perform the printing operation. The upper member of the toggle 122 is pivotally connected to a slide 123 connected to the platen 10. The movements of the slide as the toggle is straightened or broken are transmitted to the platen supporting plunger 68 which is slidably mounted within and with relation to the slide through the medium of a heavy coiled spring 130 interposed between a collar 132 fixed to the plunger and a second collar 134 secured upon a sleeve 136 bolted to the upper of two cam members 137, 138 forming a part of a compensating mechanism for compensating for the gradual diminution in the thickness of the body of the book as successive printed pages are turned. Inasmuch as such compensating mechanism of itself forms no part of the present invention further description of it is omitted and reference is made to the above-mentioned Gale application for the details thereof.

From the description of the illustrated machine it will be apparent that in accordance with the present invention provision has been made for effecting a uniformity in the printing impression in those instances where the distribution of the printing is not uniform

and where heretofore darker and heavier impressions have been obtained in some parts of the work.

While the preferred embodiment of the invention has been herein illustrated and described, it will be understood that the invention may be embodied in other forms within the scope of the following claims.

Having thus described the invention what is claimed is:

1. A printing press having, in combination, a printing element, a work supporting platen, actuating mechanism for relatively moving the printing element and the supporting platen to perform the printing operation, and means for supporting the platen having provision whereby the platen may be supported on a longitudinal axis, and means for effecting adjustment of said supporting axis transversely of the platen to permit the support to coincide with the center of pressure produced during the printing operation.

2. A printing press having, in combination, a printing element, a work supporting platen, means for effecting relative movement of the printing element and work supporting platen to perform the printing operation, supporting means for permitting tilting of the work supporting platen about an axis, and means for adjustably positioning the supporting means for the purpose specified.

3. A printing press having, in combination, a printing element, a work supporting member, a movable member provided with a knife edge upon which the work supporting member is mounted, and means for adjustably positioning the knife edge with relation to the distribution of the printing over the surface of the work to insure substantially uniform intensity of impression irrespective of inequalities in the distribution of the printing over the surface of the work.

4. A printing press having, in combination, a printing member, a work supporting member, means for effecting relative movement of said members to perform the printing operation, means for pivotally supporting one of the members, and means for adjustably moving the pivot support with relation to the distribution of the printing over the surface of the work so as to insure substantially uniform intensity in the printing impression in the different parts of the work.

5. A printing press having, in combination, a printing member, a work supporting member, means for effecting relative movement of said members to perform the printing operation, a yieldable mounting for one of the members to compensate for variations in the thickness of the work, and means for adjustably supporting one of the members in a manner such as to insure equalized intensity in the printing impression irrespective of in-

equalities in the distribution of the printing.

6. A printing press having, in combination, a printing member, a work supporting member, means for yieldingly supporting the work supporting member, means for raising and lowering the work supporting member to perform the printing operation, and mechanism for effecting adjustment of the work supporting member including means for effecting the tilting of the work supporting member in one direction, and a movable pivot support about which the work supporting member may tilt in another direction.

7. A printing press having, in combination, a printing member, a work supporting member, means for effecting relative movement of the work supporting member and printing member to perform the printing operation, and means for supporting a work supporting member including a knife edge upon and about which the work supporting member is mounted to be capable of tilting, and means for pivotally supporting the knife edge and work supporting member to permit both to tilt about an axis extending transversely of the knife edge.

8. A printing press having, in combination, a printing member, a work supporting member, means for effecting relative movement of said members to perform the printing operation, and means for supporting the work supporting member including a plunger provided with a bracket upon its upper end, a knife edge pivoted to the bracket, an eccentric mounted upon the bracket and cooperating with the knife edge to effect pivotal movement thereof, said knife edge being arranged to support the work supporting member to permit tilting thereof transversely of the knife edge, and means for effecting movement of the knife edge in a transverse direction with relation to the bracket and work supporting member.

In testimony whereof I have signed my name to this specification.

STANLEY R. HOWARD.