A. C. CHRISTOPHERSON.

PRINTING PRESS.

APPLICATION FILED DEC. 30, 1920.

1,411,267.

Patented Apr. 4, 1922.

2 SHEETS—SHEET 1.

Fig. 1.

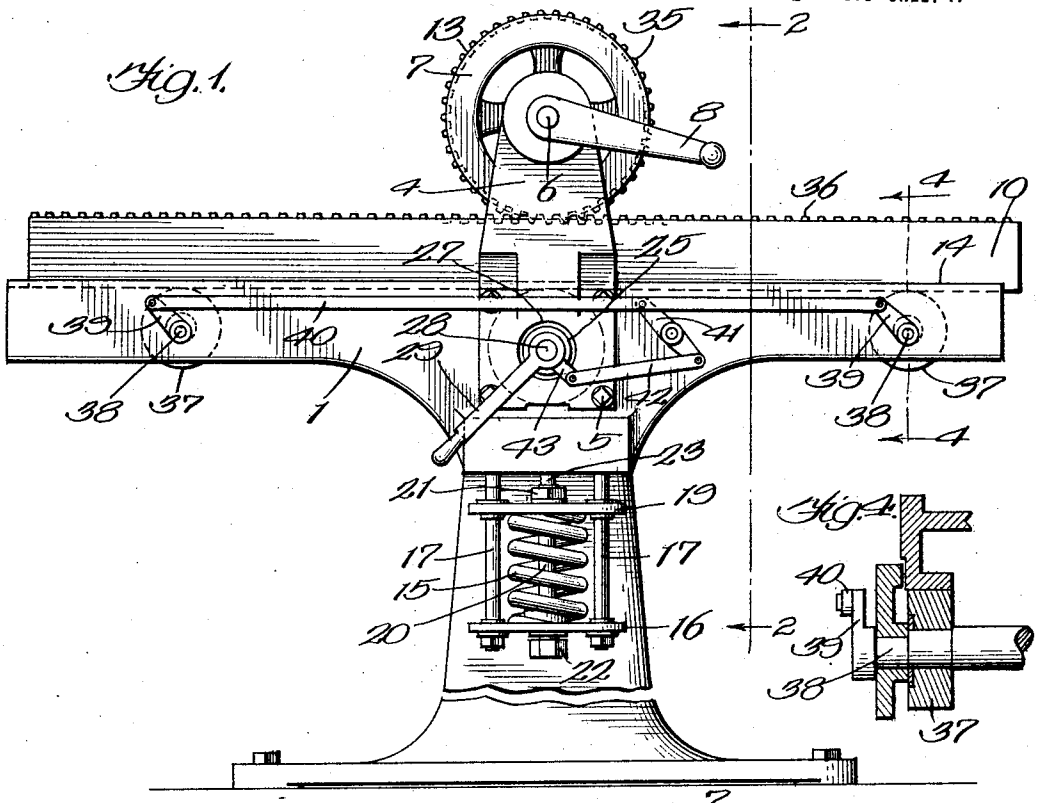


Fig. 4.

Fig. 2.

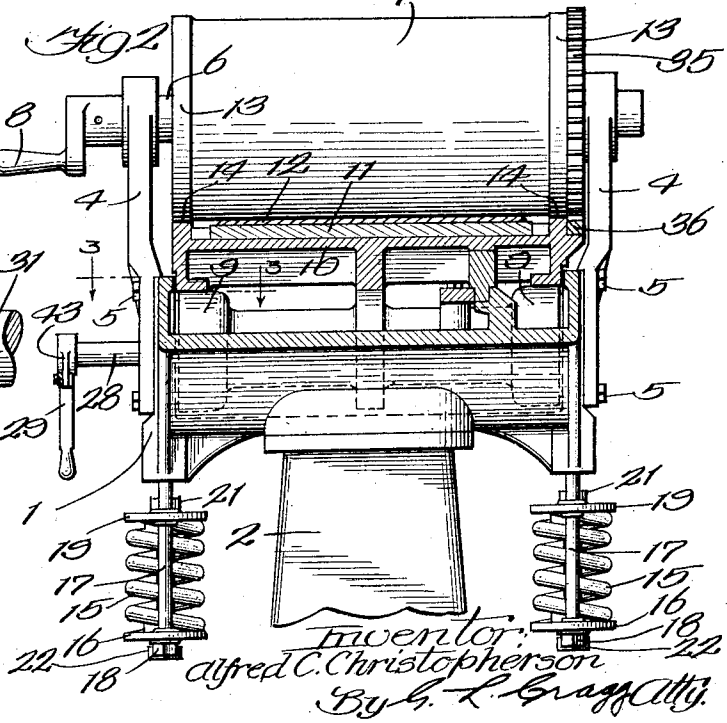
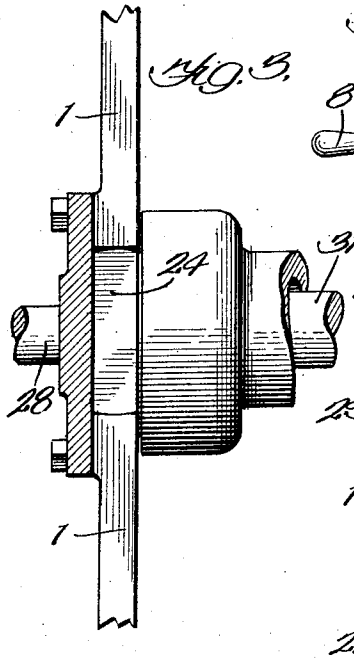


Fig. 3.



Inventor:
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2 SHEETS—SHEET 2.

Fig. 5.

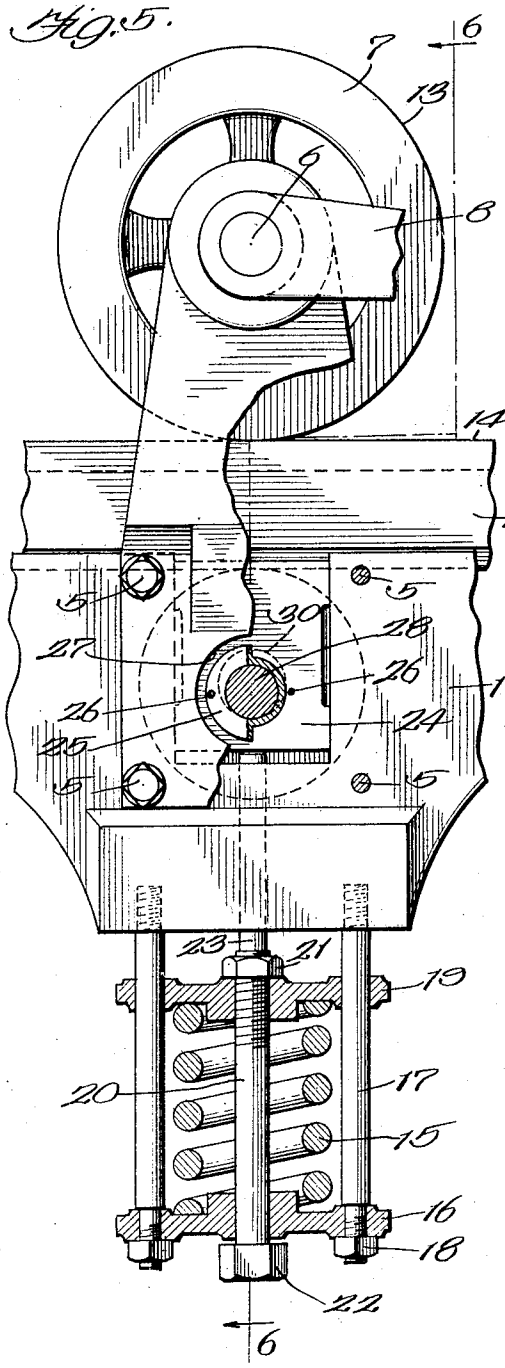
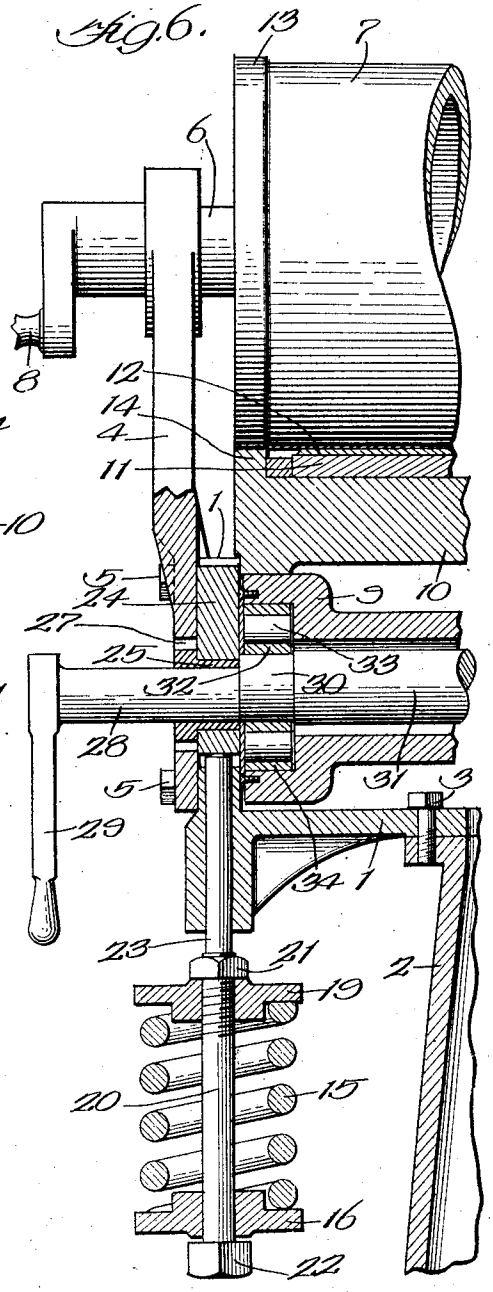


Fig. 6.



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UNITED STATES PATENT OFFICE.

ALFRED C. CHRISTOPHERSON, OF MENASHA, WISCONSIN, ASSIGNOR TO HACKER MANUFACTURING CO., OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

PRINTING PRESS.

1,411,267. Specification of Letters Patent. Patented Apr. 4, 1922.

Application filed December 30, 1920. Serial No. 434,029.

To all whom it may concern:

Be it known that I, ALFRED C. CHRISTOPHERSON, citizen of the United States, residing at Menasha, in the county of Winnebago and State of Wisconsin, have invented a certain new and useful Improvement in Printing Presses, of which the following is a full, clear, concise, and exact description.

My invention relates to printing presses and includes the provision of means for effecting printing pressure between printing press members that are equipped with bearers which limit the extent to which said members may be approached under the influence of the printing pressure exerting means. If the printing space defined by the contacting bearers should be too narrow to accommodate the paper being printed upon and the printing form or element that are between the printing members in the printing operation, the aforesaid printing pressure effecting means will yield to permit such separation of the bearers that would avoid any increase in the printing pressure between the printing members. I further provide means for rendering the printing pressure exerting means functionless for its purpose to enable or permit separation of the printing members in the non-printing operation of the press.

The printing pressure exerting means is preferably in the form of spring mechanism which is effective, in the printing operation, to move one printing member into printing relation with the other and to maintain the bearers of these members in contact if the printing form and the paper being printed upon together do not exceed the proper printing depth or type height, the spring mechanism yielding to permit a separation of the bearers if the aggregate depth of the printing form and the paper being printed upon is excessive. By the construction of my invention the printing pressure between the printing members of a press cannot exceed the printing pressure exerting force of the spring mechanism, the printing member that is directly influenced by the spring mechanism yielding, in opposition to the force of the spring mechanism, if the aggregate depth of the printing form and paper is excessive, to a point at which the spring mechanism exerts the printing pressure for which it is designed.

Hitherto separation between the bearers of the printing members of a press, due to the pressure thereon of the printing form and paper having an aggregate excessive depth, was permitted by the springing of structural parts of the press that were liable to retain warped or set shapes.

I will explain my invention more fully by reference to the accompanying drawings showing the preferred embodiment thereof and in which Fig. 1 is a view in side elevation of one form of printing press constructed in accordance with the invention; Fig. 2 is a sectional view on line 2—2 of Fig. 1; Fig. 3 is a sectional view on line 3—3 of Fig. 2; Fig. 4 is a sectional view on line 4—4 of Fig. 1; Fig. 5 is a view looking at one side of the press showing parts thereof on a larger scale, portions being broken away and other portions being shown in section; and Fig. 6 is a sectional view on line 6—6 of Fig. 5.

Like parts are indicated by similar characters of reference throughout the different figures.

The main supporting frame 1 of the machine includes a suitable pedestal 2 which may be separately formed from the balance of the frame and assembled therewith by means of the bolts 3. Upright brackets 4 are bolted at 5 to the frame of the machine. The shaft 6 of the printing cylinder 7 is rotatably supported in the upper ends of said brackets and, if the press is a hand press, a crank 8 is applied to the shaft 6 in order to turn the printing cylinder, although it is to be understood that any means may be employed for performing this function. Thus, in the preferred embodiment of the invention, the axis of rotation of the cylinder is substantially stationary, that is non-traveling, in the printing operation and is also substantially stationary, that is non-traveling in the non-printing operation. A bearer roller 9 is supported by the frame 1 substantially vertically beneath the printing cylinder. The reciprocating printing bed 10 is supported upon the bearer roller 9, at least in part, this bed being adapted to carry the employed printing form 11 of any suitable character. The bed 10 is pressed upwardly during the printing operation, as will hereinafter more fully appear, in order that the requisite printing pressure may be exerted by the printing form upon the paper 12 passing through the press.

The printing cylinder is provided with the usual bearers 13 at the sides of the press and the bed is provided with the usual bearers 14, also at the sides of the press, upon which the bearers 13 roll as the bed is moved in each printing operation, these bearers, when contacting, defining the normal printing space between the printing members 7 and 10. Coiled springs 15, one upon each side of the press, constitute the preferred means for effecting the desired printing pressure. The lower end of each of these springs has an abutment 16 fixedly assembled with the lower ends of the rods 17 that are themselves fixedly carried by the frame 1 from which the rods depend. The lower threaded ends of the rods 17 are reduced in diameter to pass through holes formed in the abutment 16 carried thereby, nuts 18 serving to clamp the abutment 16 against the larger portions of the rods. The upper end of each spring 15 has a floating abutment 19 in sliding engagement with the rods 17 that pass through holes formed in the ends of this latter abutment. A rod 20 is in threaded engagement with the abutment 19, there being also a lock nut 21 upon the rod 20 to hold this rod and the abutment 19 in fixed relation. The lower end of the rod 20 is formed with a head 22 that constitutes the rod a bolt. Each abutment 19 and the corresponding bolt head 22 are so spaced apart that when the spring 15 therebetween is effecting printing pressure, during the printing stroke of the bed, through the elements hereinafter to be described, the head 22 will not contact with the abutment 16 but when the adjustment is such that the bed 10 is to be permitted to drop by gravity away from the cylinder 7, during the non-printing stroke of the bed, the head 22 will engage the abutment 16 to act as a stop to prevent the spring from exerting printing pressure in order that the bed 10 may then be free to fall away from the cylinder 7 in the non-printing stroke.

As illustrated, each spring 15 performs its function through a continuation 23 of the rod 20, this continuation 23 being in snug sliding fit with a vertical opening in the corresponding side of the frame 1. The upper end of each rod continuation 23 bears against the lower side of the corresponding floating block 24 upon the same side of the press with the engaging rod continuation 23. Each floating block 24 supports a bearing 25 that may be held in fixed relation therewith as by means of the dowel pins 26. Each upright bracket 4 is formed with a large opening 27 in which the corresponding bearing 25 is received, this opening in each bracket 4 affording ample clearance between such bracket and the bearing 25 surrounded thereby to permit suitable range of vertical movement of the corresponding block 24. A shaft 28 is journaled in each bearing 25, both of these shafts being relatively fixed and co-axial. One of these shafts, in the case of a hand operated press, is provided with a crank 29 by which the shafts may be turned in unison upon their common axis which is defined by the aligned bearings 25. An element 30 is formed or otherwise fixed upon and in eccentric relation to each shaft 28, these eccentrics being co-axial and being joined by the shaft section 31 whereby the eccentrics, as well as the shafts 28, are held in fixed relation so that the operations effected by the movements of the crank 29 upon one side of the press are duplicated upon the other side of the press. An inner cylindrical raceway 32 is provided upon each eccentric 30, the peripheral surfaces of these raceways being co-axial with each other and with the eccentrics 30 about which the raceways are disposed. Bearing rollers 33 turn upon the raceways 32 and support the outer raceways 34, the inner surfaces of these latter raceways being also co-axial with the eccentrics 30. The raceways 34 are mounted in the ends of the bearer roller 9.

For the printing stroke the crank 29 is turned to bring the axis of the eccentrics 30 above the common axis of the shafts 28. In this adjustment, the bearer roller 9 is raised with respect to the co-axial shafts 28 and the heads 22 of the bolts 20 are lowered sufficiently from the abutments 16 to afford working ranges for the springs 15 to enable them to exert printing pressure unimpeded by the engagement of the bolt heads 22 with the abutments 16 whereby the bearer roller 9 is lifted and pressed against the bed 10 to bring the printing form 11 into printing relation with the paper 12. The spring effected printing pressure is maintained during the printing stroke of the printing bed 10 that is effected during the rotation of the cylinder 7 in one direction and through the intermediation of the spur gear 35 co-axial with said cylinder and the rack 36 fixed upon one side of the printing bed. During the non-printing stroke of the bed such bed is to be lowered sufficiently to separate the bearers 13, and 14, in accordance with common practice. The extent to which the bed 10 is lowered is insufficient to uncouple the gear elements 35 and 36 so that when the cylinder 7 is reversely rotated in the non printing stroke the bed 10 may be moved in an opposite direction from that in which it was moved in the printing stroke. In order to lower the bed 10 for the non-printing stroke the crank 29 is moved to lower the eccentrics 30. In the first part of the lowering movement of these eccentrics the bolt heads 22 are engaged with the bottom sides of the abutments 16. When these bolt heads

have engaged these abutments the springs 15 can no longer function to exert upward pressure upon the blocks 24 so that, upon continuation of the eccentric lowering movement of the crank 29, the bearer roller 9 will be lowered by gravity to permit the bed 10 to drop from the cylinder 7 only to such an extent that the gear elements 35 and 36 will not be unmeshed but to an extent which will secure the desired separation of the bearers 13 and 14 for the non-printing operation.

The spacing between the bolt heads 22 and the abutment 16, that is present when the springs 15 are performing their function, is sufficiently small in relation to the degree of eccentricity of the shafts 28 and the eccentrics 30 that said bolt heads will encounter the abutments 16 during the first small portion of the bed lowering movement of the crank 29 so that upon further movement of this crank the eccentrics 30 may function to lower the bearer roller 9 unopposed by the action of the spring.

It is preferred to provide additional bearer rollers 37 which are supported in a manner similar to the bearer roller 9, but which do not quite reach the horizontal plane that includes the points of contact of the bearer roller 9 with the bed 10. The bearer rollers 37 are associated with shafts 38 that correspond to the shafts 28, the shafts 38 having eccentrics thereon similar to the eccentrics 30 and similarly positioned with respect thereto, the eccentrics upon the shafts 38 carrying roller bearings that are in supporting relation to the bearer rollers 37, the arrangement of these roller bearings being similar to that which is employed in conjunction with the bearer roller 9. As the mountings for the bearer rollers 37 are thus in all essential respects similar to the mountings for the bearer roller 9, it is not deemed necessary to illustrate the mountings for the former bearer rollers. Cranks 39 are mounted upon these shafts 38 that are upon the same side of the press with the crank 29, the cranks 39 being related to the shafts 38 as is the crank 29 with the shaft 28 carrying it. All of these cranks 29 and 39 are operated in unison in order that the various eccentrics may be similarly positioned in all adjustments of the crank 29. To this end the cranks 39 are joined by a link 40. This link is joined with one end of a centrally pivoted rocker arm 41, the other end of this rocker arm being joined by a link 42 with the arm 43 that is in fixed relation to the crank 29.

While I have herein shown one printing member in the nature of a cylinder and the complemental printing member in the nature of a reciprocating bed which carries the printing form, I do not wish to be limited to this arrangement nor to the particular member which carries the printing form as it is obvious that my invention may be embodied in printing presses in which the printing members are otherwise shaped, operated and interrelated.

It will be observed from the foregoing description that the spring mechanism is adjustable to determine the degree of printing pressure that is to be exerted thereby whereby such pressure may be suited to the character of the printing to be performed and the nature of the printing elements employed.

While I have herein shown and particularly described the preferred embodiment of my invention I do not wish to be limited to the precise details of construction shown as changes may readily be made without departing from the spirit of my invention, but having thus described my invention I claim as new and desire to secure by Letters Patent the following:—

1. A printing press including two printing members each provided with bearers engaging bearers upon the other in the printing operation; printing pressure exerting means for maintaining the engaging bearers in contact during the printing operation and permitting separation of the engaging bearers to prevent undue increase of the printing pressure; and means for separating the engaging bearers.

2. A printing press including two printing members each provided with bearers engaging bearers upon the other in the printing operation; printing pressure exerting means for maintaining the engaging bearers in contact during the printing operation and permitting separation of the engaging bearers to prevent undue increase of the printing pressure; and means permitting separation of the engaging bearers and for then depriving the printing pressure exerting means of its function.

3. A printing press including two printing members one above the other and each provided with bearers engaging the bearers upon the other in the printing operation; printing pressure exerting means, operating the lower member, for maintaining the engaging bearers in contact during the printing operation and permitting the separation of the engaging bearers to prevent undue increase of the printing pressure; and means for depriving the pressure exerting means of its function to permit the lower printing member then to lower away from the upper printing member.

4. A printing press including two printing members one above the other and each provided with bearers engaging the bearers upon the other; a bearer roller in supporting relation to the lower printing member; a shaft structure having eccentric formation thereupon in supporting relation to said bearer roller; vertically movable bearings

for said shaft structure; spring mechanism exerting pressure upwardly upon said bearings and therethrough upon said bearer roller and the printing member supported by the bearer roller to effect printing pressure, said spring mechanism yielding to permit separation of engaging bearers to avoid undue increase in the printing pressure; and means for engaging the spring mechanism to stop the action thereof when said shaft structure is turned to lower the bearer roller to permit the lower printing member to move away from the upper printing member.

5. A printing press including two printing members one above the other and each provided with bearers engaging the bearers upon the other, the upper printing member being in the form of a cylinder and the lower printing member in the form of a reciprocating bed geared to the cylinder; a bearer roller in supporting relation to the lower printing member; a shaft structure having eccentric formation thereupon in supporting relation to said bearer roller; vertically movable bearings for said shaft structure; spring mechanism exerting pressure upwardly upon said bearings and therethrough upon said bearer roller and the printing member supported by the bearer roller to effect printing pressure, said spring mechanism yielding to permit separation of the engaging bearers to avoid undue increase in the printing pressure; and means for engaging the spring mechanism to stop the action thereof when said shaft structure is turned to lower the bearer roller to permit the lower printing member to move away from the upper printing member.

6. A printing press including two printing members each provided with bearers engaging bearers upon the other in the printing operation; printing pressure exerting spring means for maintaining the engaging bearers in contact during the printing operation and permitting separation of the engaging bearers to prevent undue increase of the printing pressure; and means for separating the engaging bearers.

7. A printing press including two printing members each provided with bearers engaging bearers upon the other in the printing operation; printing pressure exerting spring means for maintaining the engaging bearers in contact during the printing operation and permitting separation of the engaging bearers to prevent undue increase of the printing pressure; and means permitting separation of the engaging bearers and for then depriving the printing pressure exerting spring means of its function.

8. A printing press including two printing members one above the other and each provided with bearers engaging the bearers upon the other in the printing operation; printing pressure exerting spring means, operating the lower member, for maintaining the engaging bearers in contact during the printing operation and permitting the separation of the engaging bearers to prevent undue increase of the printing pressure; and means for depriving the pressure exerting spring means of its function to permit the lower printing member then to lower away from the upper printing member.

9. A printing press including two printing members one of which is a rotatable cylinder whose axis of rotation while printing is substantially stationary, each printing member being provided with bearers engaging bearers upon the other in the printing operation; printing pressure exerting means for maintaining the engaging bearers in contact during the printing operation and permitting separation of the engaging bearers to prevent undue increase of the printing pressure; and means for separating the engaging bearers.

10. A printing press including two printing members one of which is a rotatable cylinder whose axis of rotation while printing is substantially stationary, each printing member being provided with bearers engaging bearers upon the other in the printing operation; printing pressure exerting means for maintaining the engaging bearers in contact during the printing operation and permitting separation of the engaging bearers to prevent undue increase of the printing pressure; and means permitting separation of the engaging bearers and for then depriving the printing pressure exerting means of its function.

11. A printing press including two printing members one above the other and one of which is a rotatable cylinder whose axis of rotation while printing is substantially stationary, each printing member being provided with bearers engaging the bearers upon the other in the printing operation; printing pressure exerting means, operating the lower member, for maintaining the engaging bearers in contact during the printing operation and permitting the separation of the engaging bearers to prevent undue increase of the printing pressure; and means for depriving the pressure exerting means of its function to permit the lower printing member then to lower away from the upper printing member.

12. A printing press including two printing members one of which is a rotatable cylinder whose axis of rotation while printing is substantially stationary, each printing member being provided with bearers engaging bearers upon the other in the printing operation; printing pressure exerting spring means for maintaining the engaging bearers in contact during the printing operation and permitting separation of the engaging bearers to prevent undue increase of

the printing pressure; and means for separating the engaging bearers.

13. A printing press including two printing members one of which is a rotatable cylinder whose axis of rotation while printing is substantially stationary, each printing member being provided with bearers engaging bearers upon the other in the printing operation; printing pressure exerting spring means for maintaining the engaging bearers in contact during the printing operation and permitting separation of the engaging bearers to prevent undue increase of the printing pressure; and means permitting separation of the engaging bearers and for then depriving the printing pressure exerting spring means of its function.

14. A printing press including two printing members one above the other and one of which is a rotatable cylinder whose axis of rotation while printing is substantially stationary, each printing member being provided with bearers engaging the bearers upon the other in the printing operation; printing pressure exerting spring means, operating the lower member, for maintaining the engaging bearers in contact during the printing operation and permitting the separation of the engaging bearers to prevent undue increase of the printing pressure; and means for depriving the pressure exerting spring means of its function to permit the lower printing member then to lower away from the upper printing member.

In witness whereof, I hereunto subscribe my name this 11th day of Dec., A. D., 1920.

ALFRED C. CHRISTOPHERSON.