F. W. McDANIEL.

PRINTING PRESS.

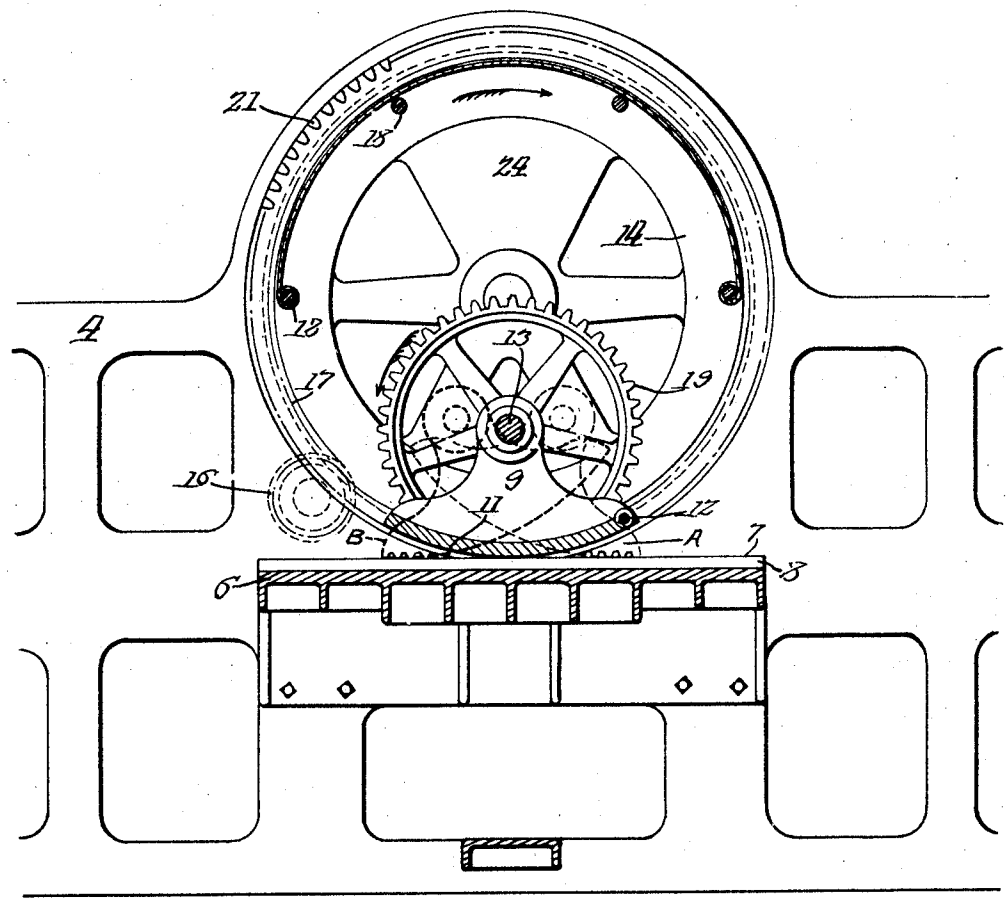
APPLICATION FILED DEC. 9, 1918.

1,316,099.

Patented Sept. 16, 1919.

2 SHEETS—SHEET 1.

Fig. 1.



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2 SHEETS—SHEET 2.

Fig 2.

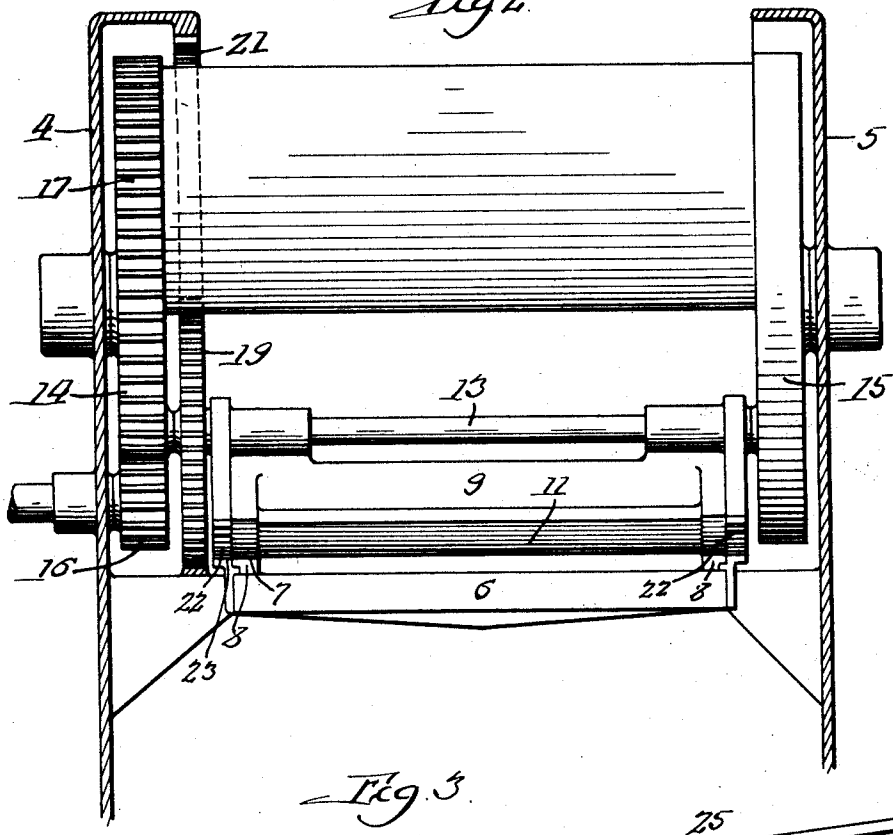
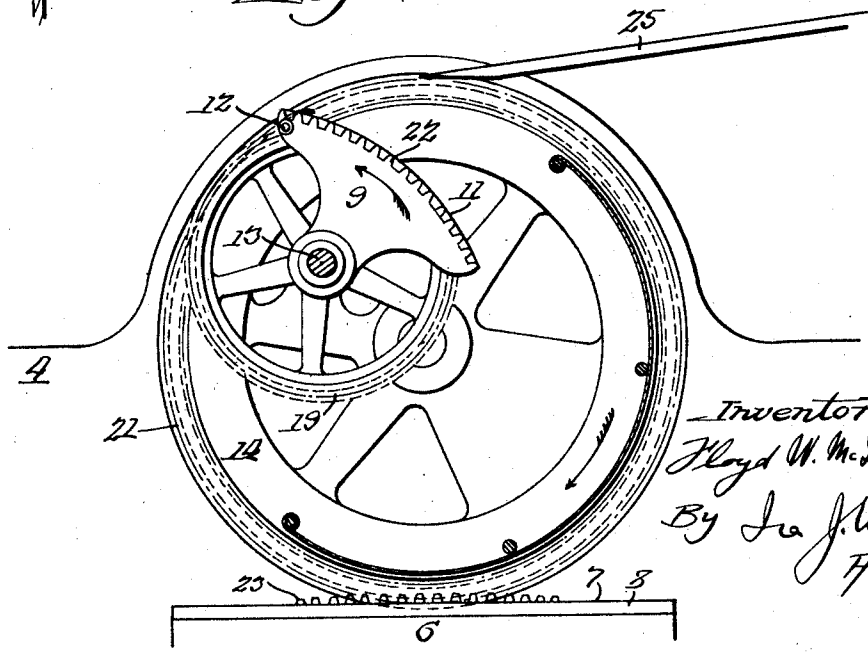


Fig 3.



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UNITED STATES PATENT OFFICE.

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PRINTING-PRESS.

1,316,099. Specification of Letters Patent. Patented Sept. 16, 1919.

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To all whom it may concern:

Be it known that I, FLOYD W. McDANIEL, a citizen of the United States, residing at Rockford, in the county of Winnebago and State of Illinois, have invented certain new and useful Improvements in Printing-Presses, of which the following is a specification.

This invention relates in general to printing presses of the bed and platen type for all grades of commercial work.

My improvements contemplate the use of a platen adapted for rolling line contact impression, the qualities of which are well recognized as being productive of clear accurate impressions under all conditions. Commercial presses now in general use embodying this method of impression are invariably of the cylinder type, in which a flat type form passes under an impression cylinder. The reciprocating type or form bed necessarily entails mechanism of a more or less heavy, complicated and costly nature for imparting the desired reciprocatory motion to the bed, and considerable power is required for reciprocating the heavy bed, especially when speed is desired.

One of the primary objects of my invention is to provide a printing press having a platen adapted for rolling line contact impression with a stationary bed and constructed in such simple and novel manner as to materially reduce the number of parts and cost of construction as compared with the ordinary cylinder press and to overcome the objections to such presses.

Another object is to provide a printing press of the character mentioned in which all parts employed for operating the platen are rotary as distinguished from reciprocating or oscillating movements employed in other presses for securing the impression. With all rotary parts in the press proper, there is little or no vibration, the running is smooth and continuous, wear is reduced to a minimum, less power is required as considerable momentum is stored in the continuously revolving parts, greater printing speed is possible, and a lighter and cheaper press will perform the same work that previously had to be done on a larger press.

I have also aimed to provide an impression platen which travels continuously through a circular path at a uniform speed, and during one portion of its cycle has a true line or rolling contact with a stationary bed and is adapted to take the sheet at another portion of its cycle in a particularly advantageous manner.

Other objects and attendant advantages will be appreciated by those skilled in this art as the invention becomes better understood by reference to the following description when considered in connection with the accompanying drawings illustrating a single embodiment of my improvements.

Referring to the drawings,—

Figure 1 is a vertical sectional view through a printing press illustrating my improvements and omitting the paper-feeding and inking mechanisms and other parts not necessary for an understanding of the present case;

Fig. 2, a cross-sectional view through the press showing the platen and bed in elevation;

Fig. 3, a fragmentary sectional view somewhat similar to Fig. 1 showing the platen approaching its paper-receiving position.

As mentioned above, the chief characteristic of my present improvements is that an accurate rolling line contact impression is obtained on a stationary form bed by an impression platen whose movement is entirely rotary. Thus, the only moving parts involved in securing the line impression are rotary parts as distinguished from those mechanisms in which a line impression is obtained from either a cylindrical platen and a reciprocating bed or from a stationary bed and an oscillating platen or variations of these movements. The many advantages of continuously rotating mechanism over those embodying a back and forth or intermittent motion are well recognized; hence, in the present case I will describe in detail simply the method by which I obtain the desired line impression on a straight stationary form bed by means of a continuously revolving, curved impression platen.

My improvements are carried by a suitable frame including side standards 4 and 5 joined by appropriate cross bracing. Interposed between and rigidly mounted upon the frame standards is a form-supporting bed designated generally by character 6. This stationary bed is adapted to carry the type form, the impression face of which lies substantially in the horizontal plane of the top surface 7 of the bed rails 8. A type

form is not shown as it is not necessary to an understanding of the present invention.

The impression platen designated generally by character 9, is preferably of segmental shape having a curved impression face 11 adapted for rolling contact with the form bed. In other respects the platen may be of any suitable or preferred construction. The platen is equipped with the usual paper grippers, which I have indicated but briefly by the location of the gripper shaft 12, and any suitable gripper-actuating means may be employed, as the particular construction or type of paper gripping means has no bearing on the present invention. The platen is fixed to a shaft 13, the ends of which are journaled in suitable bearings in the platen-supporting members 14 and 15. These members preferably take the form of drive wheels journaled respectively in axial alinement on the frame standards 4 and 5. Suitable mechanism is provided for continuously revolving the members 14 and 15, such for example as a driving pinion 16 meshing with the bull gear 17 formed integral with the platen - supporting member 14. The members 14 and 15 are rigidly united together so as to revolve in perfect unity, and for this purpose a plurality of tie bars 18 are interposed between the members binding them rigidly together. Upon the shaft 13 at one side of the platen, I fix a spur gear 19 which meshes with an internal stationary rack 21, which in the present case is integrally attached to the standard 4. It will be noted that the internal rack 21 is concentric with the driving members 14 and 15 and that the form face 7 is substantially tangential to the pitch diameter of the rack. It will be further noted that when the platen is in the full line position shown in Fig. 1, its curved impression surface is coincident with the pitch diameter of the rack and consequently is on an arc the center of which is coaxial with the driving members 14 and 15 and the rack. Attention is also directed to the diameter of the gear 19 which is one-half the diameter of the rack 21.

By reason of the relative relation and dimensions of the parts just described, a peculiar rolling movement will be imparted to the platen to produce the line-impression contact desired. As the parts are shown in full lines in Fig. 1, the platen is midway of its rolling impression movement. The driving members 14 and 15 are constantly revolved in a clockwise direction viewing Fig. 1 and carry the platen through a circular path. During this continuous rotary movement, the platen will be independently revolved in a counter-clockwise direction about the axis of its shaft 13 by reason of the fact that the gear 19 rolls within the rack 21. Because of the relative diameters of the gear 19 and rack 21, the platen will make one complete revolution in a counter-clockwise direction about its axis 13 while the latter travels one complete revolution in a clockwise direction, commencing with the full line position shown in Fig. 1. During a predetermined portion of the cycle of the shaft 13 the face 11 of the platen will evolve a rolling line contact with the face of the form bed in which said face is tangential to the platen face at all times at the point of contact. Thus, an accurate line-contact impression is obtained without slurring the impression. In Fig. 1, I have indicated by light dotted lines A the position assumed by the platen at the beginning of the impression and in heavy dotted lines B the completion. At every point in this contact the center from which the impression surface 11 is struck will be in a horizontal plane passing through the center of the rack, and consequently the platen and form bed are in tangential relation at every point throughout the rolling contact. In order to insure against any vibration between the platen and form bed which might occur from inaccuracies or wear, I have equipped the platen at each end with an alining rack 22 adapted to mesh with stationary racks 23 on the bed. The driving members 14 and 15 are weighted at 24 to counterbalance the platen and thus insure smooth steady running with the parts in proper balance.

The sheets are fed to the platen from a suitable feed board indicated by character 25 in Fig. 3. In this figure the platen is shown approaching the feed board and the position at which it receives the paper. The sheet feeding and delivering mechanism and the ink distributing mechanism form no part of the present invention, and consequently I have deemed it unnecessary to illustrate their coöperation with the printing mechanism proper.

From the foregoing it will be apparent that I have provided a printing press in which a revolving platen effects a true rolling line contact impression on a stationary form bed. So far as I am aware, a printing mechanism of this character is broadly new. That is, while line impressions have been attained by cylindrical presses having a reciprocating form bed, or by presses having a stationary form bed and an oscillating platen, or by combinations of variable rotating platens and reciprocating form beds, nevertheless, in each of these prior mechanisms, intermittent reciprocatory or oscillatory motions are relied upon, as distinguished from the continuous rotary motion of a platen in connection with a stationary bed as involved in my present invention. Although certain advantages of this construction have already been prefaced above, attention is directed to the pronounced simplicity of the construction and to the com-

paratively few parts involved as compared with the more or less complicated constructions of other presses designed to produce a line impression. It is believed that the foregoing conveys a clear understanding of the principles and objects of my invention, and while I have illustrated but a single embodiment thereof, it should be understood that the same is susceptible of various changes and modifications in the arrangement, proportions and construction without departing from the spirit and scope of the invention as expressed in the appended claims.

I claim:

1. In a printing press, an impression platen mounted to travel bodily about a fixed axis and having a curved impression face, the arc of which is struck from substantially the center of said pivot axis, and means for imparting an independent rotary movement to the platen about an axis eccentric to said stationary axis.

2. In a printing press, a stationary form bed, a platen having a curved face adapted for rolling contact with the form bed, means supporting the platen and pivotally mounted to move about an axis coincident with the center from which the arc of the platen face is struck, a rack having a pitch diameter substantially coinciding with the arc of the platen face, and a toothed engagement between the platen and said rack for modifying the movement of the platen while the latter is moved about the axis of said platen-carrying means, to thereby effect a rolling line contact impression.

3. In a printing press, a stationary flat form bed, a platen having a curved surface adapted for rolling contact with the form bed, and mechanism for continuously revolving the platen through a circular path into and out of printing relation with the bed and for producing a rolling line contact impression between the platen and bed while in printing relation thereto, the radial distance between the platen axis and the axis about which the platen travels being constant.

4. In a printing press, the combination of a stationary flat form bed, a pair of spaced platen-supporting members revoluble about a fixed axis, a platen interposed between and mounted upon said members to revolve about an axis eccentric and fixed with respect to that of said members and having a curved face adapted for rolling contact with the form bed, means for continuously revolving the platen supporting members to carry the platen into and out of printing relation to the bed, and means for imparting a rotary motion to the platen about said eccentric axis while the platen is traveling about said fixed axis for effecting a rolling line contact impression with the bed.

5. In a printing press, a stationary flat form bed, a platen having a curved face adapted for rolling contact with said bed, an internal circular rack, a gear fixed with the platen and meshing with the rack, and means for revolving the gear within the rack whereby the platen travels in a circle co-axial with said rack and is thereby brought into and out of rolling contact with the bed.

6. In a printing press, a stationary flat form bed, a platen adapted for line contact with said bed, a stationary internal circular rack, a gear fixed with the platen and constantly in mesh with the rack so that the platen travels in a circle co-axial with said rack, and driving mechanism for continuously revolving the gear whereby the platen will be carried through a circular path and will revolve independently about the axis of said gear.

7. In a printing press, a stationary flat form bed, a pair of spaced platen-supporting members revoluble about a common axis, a platen interposed between and mounted upon said members to revolve about an axis eccentric thereto and having a curved face adapted for rolling contact with the bed, a stationary internal circular rack concentric with the platen-supporting members, and a gear fixed with the platen and meshing with said rack whereby to impart rotary motion to the platen when the latter is revolved by the platen-supporting members.

8. In a printing press, a stationary flat form bed, a segmental platen adapted for rolling contact with the bed, and means for constantly revolving the platen in a circular path about a fixed axis and for imparting a rolling movement to the platen during a predetermined portion of its cycle for effecting a true line contact impression with the stationary form bed.

9. In a printing press, a stationary flat form bed, a platen having a curved face adapted for rolling contact with the bed, mechanism supporting the platen so that it is revoluble about an axis which travels in a circular path, and means for imparting such rotary movement to the platen while it follows said circular path as to effect a true rolling line contact with the bed.

10. In a printing press, a stationary flat form bed, a platen having a curved face adapted for rolling contact with the bed, a gear fixed with the platen and about the axis of which the platen is revoluble, a stationary internal circular rack with which the platen gear meshes, and continuously revolving driving means concentric with the rack and carrying the platen, whereby the latter travels in a circular path concentric with the rack and during a predetermined portion of its cycle will be brought into and out of rolling contact with the bed.

11. In a printing press, a platen adapted for a rolling line contact, rotary means supporting the platen, a circular rack co-axial with said rotary means, a stationary flat form bed the form line of which is substantially tangential to the pitch diameter of said rack, and means operative between the rack and platen for imparting rotary motion to the latter during rotation of said platen-supporting means to produce said rolling line contact with the form bed.

12. In a printing press, a stationary annular rack, a gear meshing with the rack and being substantially one-half the diameter thereof, platen-supporting means revolubly mounted concentric with said rack, a platen fixed with said gear and mounted on said supporting means to evolve about the axis of the gear and having a curved face struck from a center substantially co-axial with that of the rack, and a stationary form bed the form line of which is substantially tangential to the pitch diameter of the rack.

13. In a printing press, a platen having a curved surface adapted for a rolling line contact, means for revolving the platen about a pivot axis substantially concentric with the center of its curved surface, means for imparting independent rotary movement to the platen about an axis intermediate said surface and said pivot axis, and a stationary form bed the form line of which is tangential to said curved surface when it is in printing position.

14. In a printing press, the combination of a stationary flat form bed, of a platen supported to travel in a circular path about a fixed center and to thereby be brought into and out of printing relation to the bed, the platen having a curved impression face, the arc of which is concentric with said axis about which the platen travels, and means for revolving the platen about an axis eccentric to the first mentioned axis while the platen is in said printing relation to produce a rolling line contact impression with the bed.

15. In a printing press of the character described, a segmental platen mounted to revolve about its axis and while so revolving to travel in a circular path about a fixed axis eccentric to that of the platen, the impression surface of the platen being an arc concentric with said fixed axis.

16. In a printing press of the character described, a stationary internal circular rack, a gear one-half the diameter of said rack and mounted to roll upon and within the rack, and a platen fixed with said gear to travel therewith and having an arcuate impression surface substantially coincident with the pitch diameter of the internal rack.

17. In a printing press of the character described, a platen having an arcuate impression surface struck from a given fixed axis, the platen being revoluble about an axis midway between its impression surface and said fixed axis, a toothed member concentric with said fixed axis, another toothed member fixed with the platen and concentric with the platen axis and adapted to mesh with the first toothed member, and means for carrying the platen in a circular path concentric with said fixed axis.

18. In a printing press of the character described, the combination of a stationary flat form bed, a platen having an arcuate impression surface adapted for rolling line contact with the form bed, means supporting the platen and for carrying it in a circular path about a fixed axis during a portion of the cycle of which travel the platen is in printing relation to the bed, and means for revolving the platen on an axis concentric with said fixed axis while the platen is in said printing relation to the bed for producing a true rolling line contact impression as the platen travels in said circular path past the flat bed.

FLOYD W. McDANIEL.