Feb. 18, 1930. P. F. COX ET AL 1,747,662

TRAVELING CYLINDER PRINTING PRESS

Filed Nov. 12, 1928 4 Sheets-Sheet 1

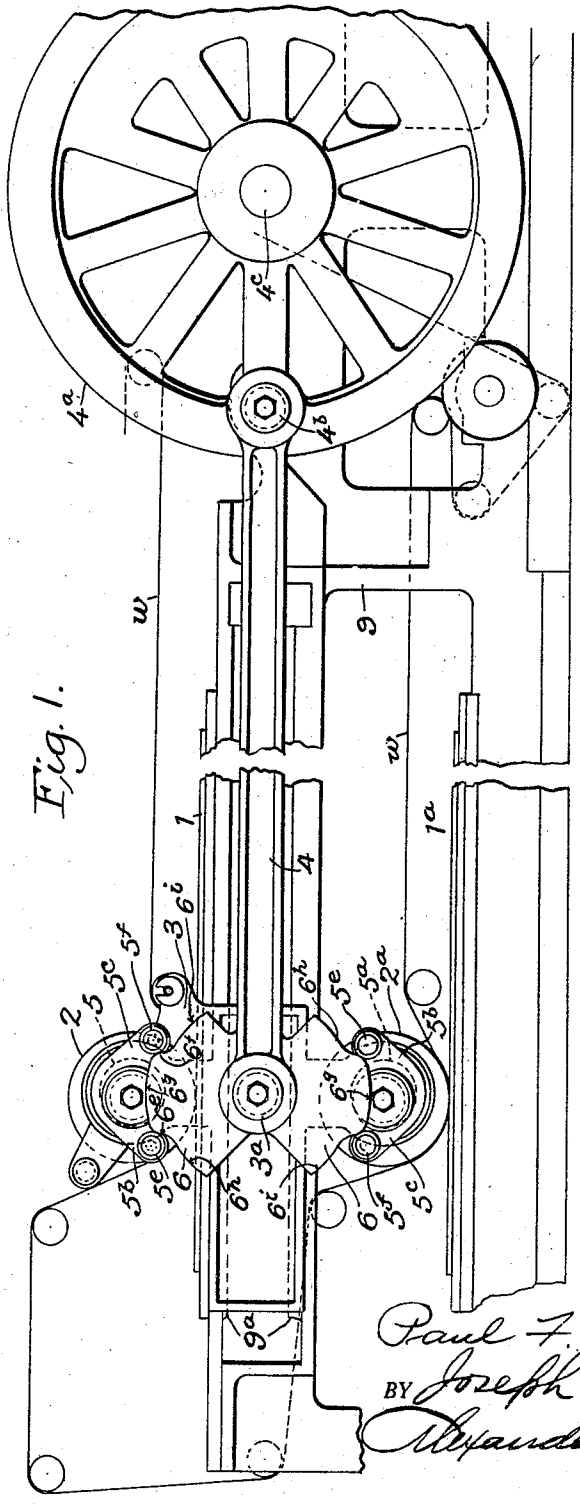


Fig. 1.

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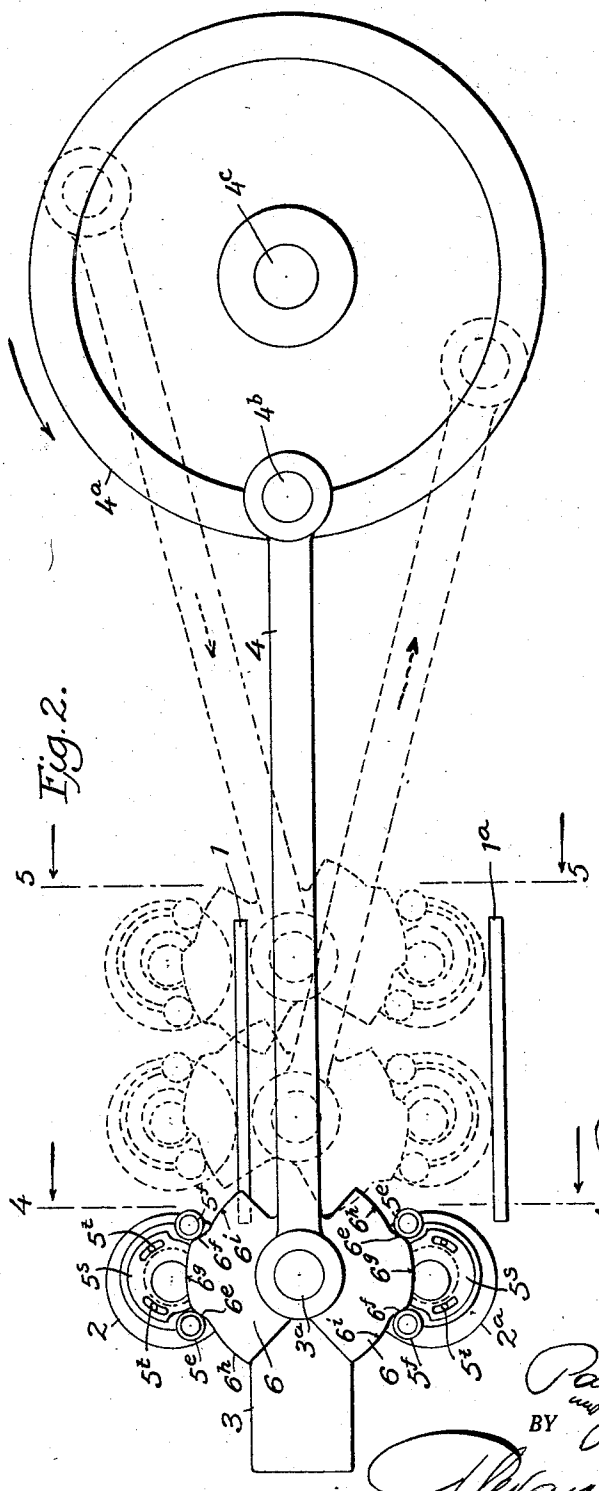


Fig. 2.

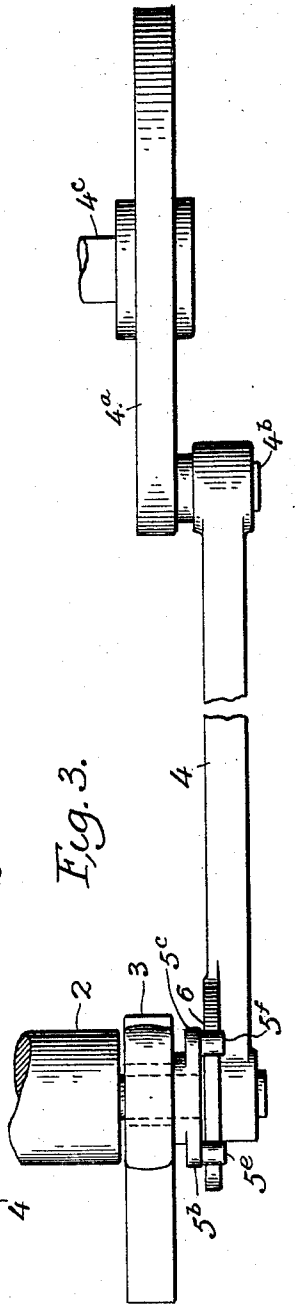


Fig. 3.

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Fig. 4.

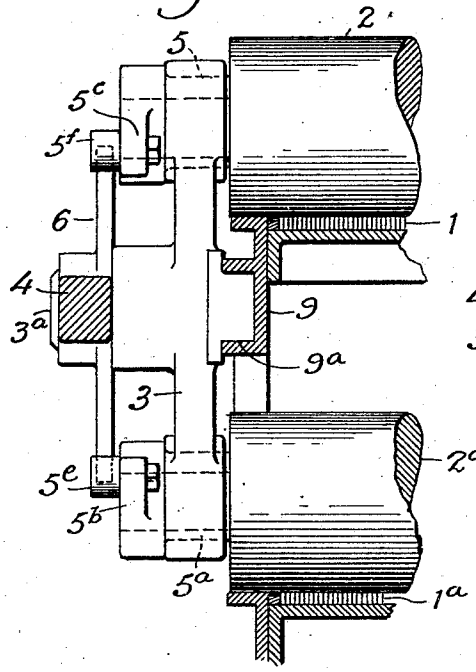


Fig. 5.

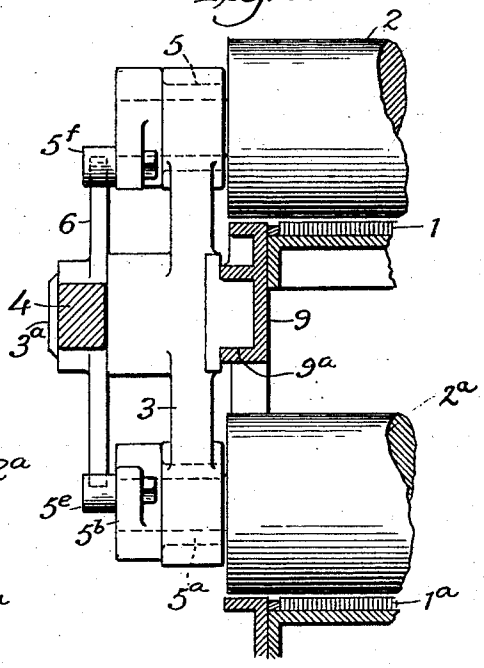


Fig. 9.

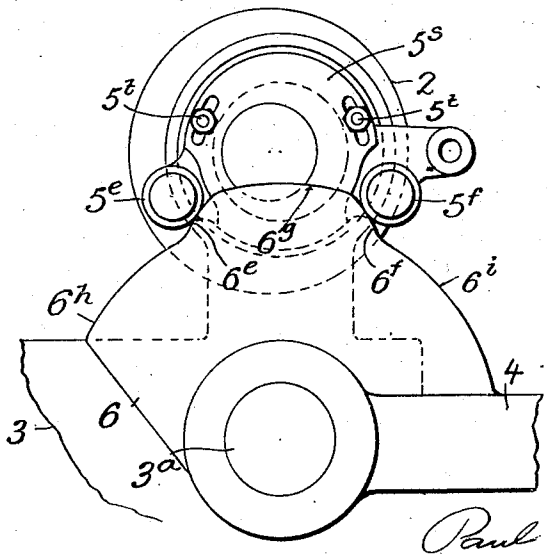
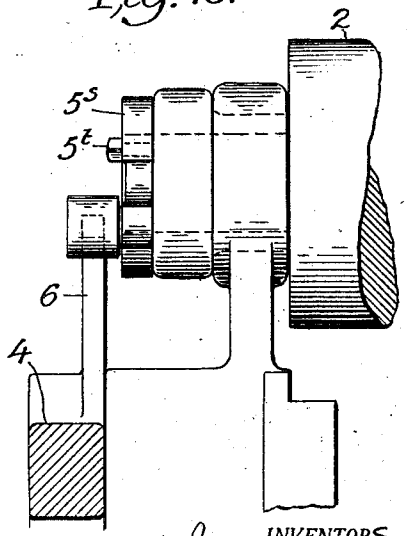


Fig. 10.



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TRAVELING CYLINDER PRINTING PRESS

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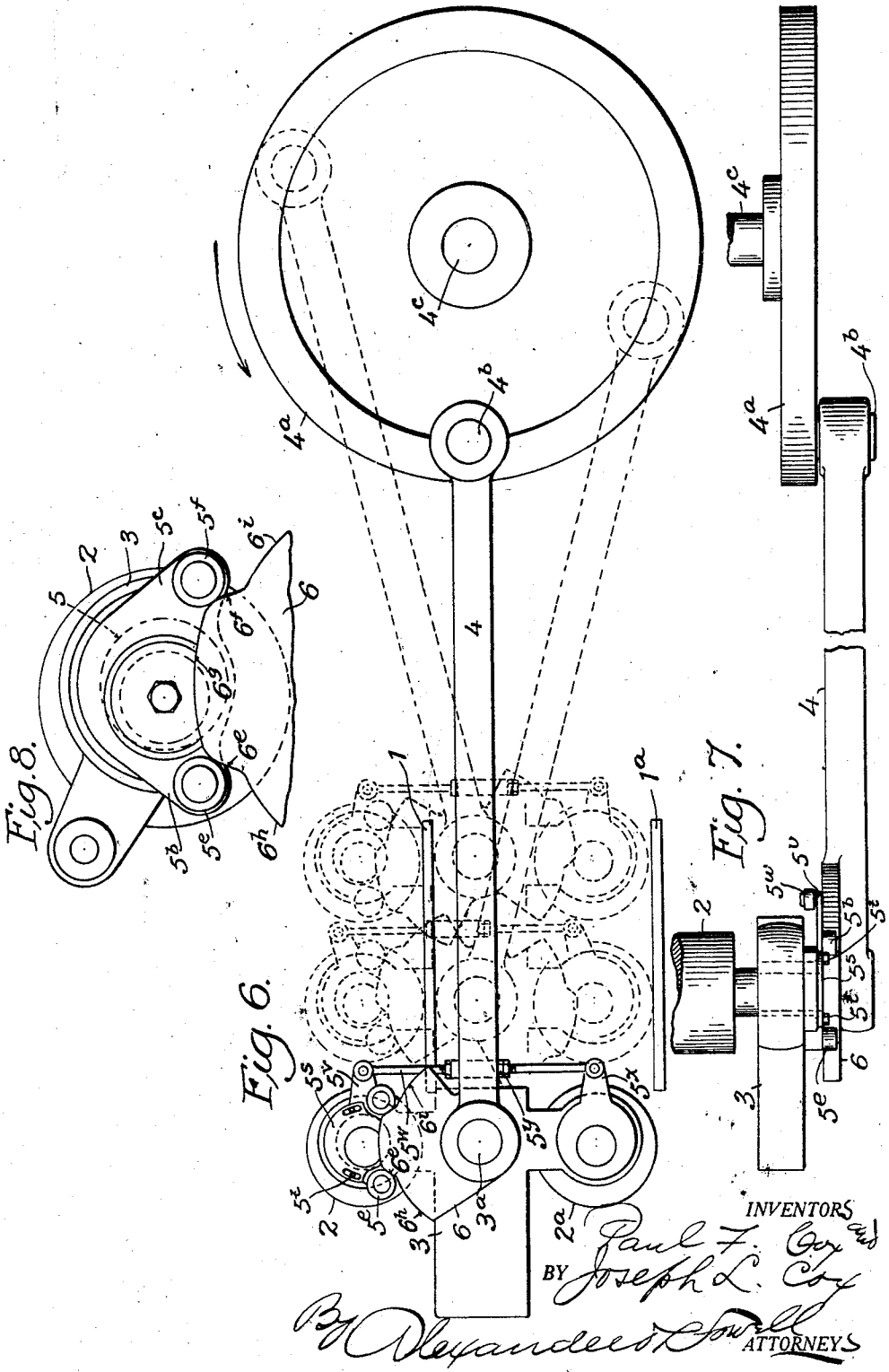


Fig. 8.

Fig. 6.

Fig. 7.

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Patented Feb. 18, 1930 1,747,662

UNITED STATES PATENT OFFICE

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TRAVELING-CYLINDER PRINTING PRESS

Application filed November 12, 1928. Serial No. 318,842.

Our invention relates to improvements in web perfecting printing presses, and particularly to that type of web perfecting printing presses in which the web is perfected by the co-operation of stationary type beds and traveling impression cylinders, such for example as shown in Patents No. 988,548 of April 4, 1911 and No. 1,457,501, of June 5, 1923. And the main object of this invention is to provide a new and improved operating mechanism for the impression cylinders, by means of which said impression cylinders will be lifted (thrown off impression) after their impression stroke, and be kept clear of the type forms on the stationary beds during their return stroke (during which time the web of paper is advanced between the type and cylinders) and then are lowered (thrown on impression) onto the bearers, or line of impression contact, that they would contact with the type forms and make an impression upon the web of paper during their impression stroke.

While the invention is primarily designed for use in a web perfecting press, it is applicable to single acting presses; and to sheet presses; and to other types of machines in which traveling cylinders are employed which are to be "thrown off impression" on one stroke and "thrown on impression" on the return stroke.

More particularly our invention provides a new and simple means for raising and lowering, and holding, reciprocating cylinders in the required "on impression" and "off impression" positions—which means are operated by the swinging movement of the driving rods or pitmen by which the cylinder carriage (i. e. "cross heads" carrying said cylinders) is reciprocated. The invention includes cams mounted on the pitmen and co-acting devices so shaped and timed that at the end of the printing stroke the impression cylinders will be thrown off impression, and so held during their return stroke, and at the end of such return stroke will be thrown on impression and so held during their next succeeding printing stroke. During both strokes the cylinders will be held rigidly and positively in position ("on" or "off" impression) without requiring any auxiliary devices such as were required in the aforesaid patented presses. In the present form the cams on the pitmen rock the eccentric boxes in which the shafts of the impression cylinders are journaled and the invention secures the desired results by utilizing the swinging movement of the pitmen, and obviates the use of a number of parts heretofore required and used to throw and hold the cylinder on and off impression.

In the embodiment of the invention shown in the drawings the cams for throwing the cylinders on and off impression, and also for holding them in such positions, during the respective strokes of the cylinders over the beds are attached to or formed on the pitmen by which the cross heads are reciprocated—and said cams are adapted to directly engage the adjustable boxes, preferably eccentric boxes, in which the journals of the cylinders are mounted in said cross heads,—the cams being so formed that the simple swinging movement of the pitmen will positively and accurately cause the lifting and lowering of the impression cylinders and hold them in their desired position. The cams are located in the most convenient position for directly coacting with the boxes on the cross heads in which the cylinders are journaled, so that the pitmen as they swing on the pins in connecting them to the reciprocating crossheads in which impression cylinders are mounted directly actuate the eccentrics in the main heads containing the journals of the impression cylinders. The natural ordinary swinging of the said pitmen causing the raising and lowering of the cylinders on or off impression and holds same in such positions.

We will explain the invention with reference to the accompanying drawings which illustrate practical embodiments of the invention as applied to a well known type of web perfecting press, a sufficient portion of such press being illustrated to enable the invention to be clearly understood by those familiar with the art. While we have shown several modifications of the invention in the drawings not as limiting or defining the scope

of the invention but as illustrating its capacity for embodiment in various forms—and we do not consider the invention limited to any of the constructions shown, as once understood those skilled in the art can readily adapt and use the same in various forms. Therefore in the claims we have summarized the essentials of the invention; and the novel features of construction and novel combinations of parts; and also specific embodiments thereof for all of which protection is desired.

In the drawings:

Fig. 1 is a partial side elevation of a web printing press showing my novel mechanism for throwing the cylinders "on" or "off" impression and for holding the same "on" or "off" impression while the cylinders are passing over the forms.

Fig. 2 is an enlarged detailed view showing by means of dotted lines different positions assumed by the cams and cylinders during a stroke.

Fig. 3 is a detail plan view of the parts shown in Fig. 2.

Figs. 4 and 5 are vertical sectional views on the lines 4—4 and 5—5 respectively Fig. 2.

Fig. 6 is a view similar to Fig. 2 showing a modification of the invention.

Fig. 7 is a detail top plan view of Fig. 6.

Fig. 8 is an enlarged detail view of one end of a cylinder showing the upper end of the cam in fragment.

Fig. 9 is a side view of a modified form for adjusting the pins.

Fig. 10 is a side elevation of Fig. 9.

In the drawings 1 and 1^a designate parallel type beds arranged one over the other in a suitable main frame 9. Cooperating with bed 1 is a traveling impression cylinder 2, and cooperating with bed 1^a is a traveling impression cylinder 2^a. These cylinders are mounted in bearings in crossheads 3 which are guided in longitudinal guideways 9^a in the sides of the press frame.

The crossheads 3 are reciprocated longitudinally of the guideways so as to move the cylinders 2 and 2^a back and forth over the beds by means of pitmen 4 connected to pins or studs 3^a on the crossheads 3, and to crank pins 4^b on crank wheels 4^a, mounted on a shaft 4^c on the main frame, and which may be rotated by any suitable means. The general construction and arrangement of the aforesaid parts in this type of presses are well known and need no further detailed explanation herein.

In such presses a web *w* is led over suitable guide rollers from the web roll to and successively between the lower cylinder 2^a and bed 1^a, and then between the upper cylinder 2 and the bed 1, to the delivery; and suitable means is provided for intermittently drawing the web forward between successive impressions, while the cylinders are "thrown off impression" but traveling over the beds. The means for feeding, guiding, leading and shifting the webs may be of any desired construction and are well understood, and form no part of the present invention, and therefore need no further detailed explanation herein.

In the press shown the cylinders print only when moving on one stroke say to the left, and are "on impression" during this stroke, and they are thrown "off impression" and held "off impression" during their return stroke. The cylinders are usually mounted in adjustable bearings which can be raised or lowered to throw the cylinders on or off impression; ordinarily eccentric rocking bushings are used, and in the drawings the cylinder 2 is shown as journaled in eccentric bushings 5 on the crosshead, and the cylinder 2^a in eccentric bushing 5^a on the crosshead. Such bearings or bushings are well known. In the construction shown the bushings 5 are provided with opposite arms 5^b and 5^c projecting at opposite sides of the cylinder journal; and said arms preferably carry studs or rollers 5^e and 5^f respectively which are adapted to respectively and simultaneously engage cam surfaces 6^e and 6^f on cam members 6 which are formed on or rigidly attached to the pitmen 4.

Each cam member 6 is provided with a peripheral cam surface which is adapted to be simultaneously engaged at different points by both pins or rollers 5^e and 5^f of the adjacent bushing 5 so that such eccentric bushing cannot move or play relatively to the cam 6 except and unless the cam is rocked or shifted.

The operation of each cam 6 upon the related eccentric bushing 5 is the same, for each and both cylinders 2 and 2^a, and a description of the operation of one will explain both.

Each cam 6 is fixed relatively to the pitman 4 when in operation but has a rocking movement relative to the cylinder bushing during the reciprocation of the cylinder due to the swinging movement of the end of the pitmen (on which the cam is mounted) upon the pin 3^a of the crosshead.

As shown in Fig. 1 each cam member 6 has two opposed cam portions 6^e and 6^f which are respectively adapted to simultaneously engage with the pins 5^e and 5^f of the bushing as the cylinder nears the end of its impression strokes and is clear of the type form. Each cam member 6 also has a dwell portion 6^g between the cam surfaces 6^e and 6^f which dwell portion is common to both rollers 5^e and 5^f. The cam 6 also has adjacent the outer sides of the cam portions 6^e and 6^f a dwell portion 6^h and 6^i which respectively coact with the pins 5^e and 5^f. The pin 5^e will move on the dwell 6^h when the pin 5^f is moving on the dwell 6^g; and conversely the pin 5^f will move on the dwell 6^i while the pin 5^e is moving on

the dwell 6^g. In the construction shown the dwells 6^g, 6^h and 6^i are practically concentric with the axis of the pin 3^a on which the pitman and cam member 6 are mounted and the cam portions 6^e and 6^f are so related that when pin 5^e is riding up on the cam 6^e, pin 5^f will be riding down on the cam 6^f and vice versa.

When pin 5^e rides up on cam 6^e it will rock the eccentric bushing 5 so as to raise the cylinder off the line of impression, thus throwing the cylinder "off impression." When the pin 5^f rides up on the cam 6^f it will rock the eccentric bushing 5 so as to lower the cylinder 2 to the line of impression, thus throwing the cylinder "on impression."

The cams 6^h being attached to the pitman 4 is rocked by the swinging movement of this pitman on the pin 3^a; the swinging movement of the pitman 4 being due to the rotation movement of the pin 4^b on the wheel 4^a.

As shown in Fig. 2 the wheel 4^a rotates anti-clockwise and consequently cam member 6 will be rocked in a clockwise direction during the time that the pin 4^b is moving 180° from a position vertically above the axis 4^c of the wheel 4^a to a position vertically below it; and (during the next one-half revolution of the wheel 4^a) the cam 6 will be rocked anti-clockwise during the movement of the pin 4^b 180° from a position directly below the axis of wheel 4^a to a position directly above said axis. Of course the extent and time of the rocking movement of the cam 6 varies according to the angularity of the pin 4^b relative to the axis of the wheel 4^a. When the pin 4^b is on the dead center (between the pin 3^a and the axis of wheel 4^a) the cam 6 is practically still, but it begins to reverse its movement as the pin 4^b passes the dead center.

Assuming that it is preferable that the cylinder be "off impression" during the outward stroke of the crossheads (i. e. away from the wheel 4^a) and should be "on impression" during the inward stroke of the crossheads (i. e. towards the wheel 4^a) the cam portions 6^e and 6^f and dwells 6^g, 6^h and 6^i are so relatively formed and calculated with respect to the swinging movement of the pitman 4 on the pin 3^a, and consequent rocking movement of the cam 6 relative to said pin, that on the inward stroke of the cylinder and after it has cleared the type-form on the bed, the cam 6^e will begin to move the pin 5^e and rock the eccentric 5 so as to raise the cylinder off impression; and the cylinder will be held off impression during the outward return stroke of the cylinder until it has cleared the outer end of the type forms on the bed; then cam 6^f will engage the pin 5^f and rock the eccentric 5 so as to lower the cylinder to the line of impression before the cylinder reaches the printing form during its inward stroke; thus throwing the cylinder on impression and holding it on impression during its inward or printing stroke; and holding it on impression until it has cleared the inner end of the type form on its inward stroke; then the cam 6^e will engage the pin 5^e and again throw the cylinder off impression as above described.

Thus, after the cylinders have cleared the forms on their inward printing stroke, they are thrown "off impression" and are held off the impression during their return stroke until they have cleared the outer end of the forms; then the cylinders are thrown "on impression" and held in such position during their inward printing stroke until they have cleared the inner ends of the forms and then they are again "thrown off" impression as described.

By reason of the opposite pitch of the cam surfaces 6^e and 6^f; and the complemental dwell portions 6^g, 6^h, 6^i; of the cam member 6, not only are the cylinders thrown on and off impression as described but they are held in such thrown on or thrown off positions and no auxiliary devices such as shown in our Patent 1,457,501 or others for locking the cylinders in on or off positions are required, and the doing away with these auxiliary locking devices obviously simplifies construction and lessens cost of manufacture.

The arms carrying the pins 5^e and 5^f can be formed integral with the eccentric 5 if desired as in Figs. 1 and 8 or can be formed on a plate 5^s which can be adjustably secured to one end of the bushing by slots and bolts 5^t as indicated in Figs. 2, 6, 9 and 10 which enables the eccentrics 5 to be adjusted rotatorially of the bearing, while maintaining the proper relative position of and engagement between the pins 5^e and 5^f and cam member 6.

When the press has two beds and two cylinders as indicated in Figs. 1 and 2, each cylinder may be constructed and operated in the manner described; but the lower cam member 6 by which the eccentrics 5 of the lower cylinder 2^a are operated is reverse of the upper cam member 6 by which the eccentric of the upper cylinder is operated as described, and the pins 5^e and 5^f of the lower bushing 5 are also reverse to the pins of the upper bushing so as to produce the proper similar raising and lowering of the cylinders in the manner above described.

If desired the set of cams and pins for operating one cylinder, can be utilized to perfect the "throwing on" or "off" of both cylinders. One means of so doing is illustrated in Figs. 6 and 7. In these figures the member 5^e of the upper bushing is provided with an extension 5^v connected by a rod 5^w with an arm 5^x on the eccentric bushing 5 in which the lower cylinder 2^a is journaled. The rod 5^w may be provided with an adjusting member 5^y to regulate or adjust the length of said

rod or distance between the pivotal connections of the rods 5^w to the arms 5^v and 5^x respectively. With this construction it is obvious that when the upper cam member 6 rocks the eccentric bearing 5 of the upper cylinder, as hereinabove explained, the rocking movement of the upper eccentric bushing 5 will through the connections 5^b, 5^w, 5^x similarly move the eccentric bushings of the lower cylinder 2^a; and consequently both cylinders 2 and 2^a will be "thrown on" or "off" impression in the manner above described, and be held "on" or "off" impression as above described; by the use of only a single set of cams and pins, instead of providing a double set of cams for each cylinder as illustrated in Figs. 1 to 5.

It will be obvious to those skilled in the art that the invention is capable of embodiment in various forms embodying the essential underlying feature of utilizing the rocking movement of the pitman to operate a cam traveling with the crossheads and actuate devices throwing cylinders "on" and "off" impression, and for holding them "on" and "off" impression during the respective strokes of the cylinders. Therefore we do not consider the invention in its broader aspects restricted to the specific constructions illustrated.

Further while the rocking eccentric bushings 5 provide a simple and easy means of raising and lowering the cylinder journals, other devices for raising and lowering the cylinders might be employed which could be controlled by the cams on the pitman or pin 3^a within the scope of our invention, and therefore we do not consider the invention in its broader aspects restricted to the use of eccentric bushings, although at present we consider cams and eccentric bushings such as illustrated preferable as they are simple in construction and efficient in operation.

We claim:

1. In a printing press having a traveling cylinder mounted in reciprocating crossheads; devices on the crossheads for throwing the cylinder on and off impression; and pitmen pivotally connected with the crossheads for reciprocating them; and cams on the pitman whereby the said throwing on and off devices are operated.

2. In a printing press having a stationary bed; a traveling cylinder cooperating with the bed; reciprocating crossheads for moving said cylinder, devices on the crossheads for throwing the cylinder on and off impression; and pitmen pivotally connected with the crossheads for reciprocating the latter; cams on the pitmen actuated by the swinging movements thereof to cause the said throwing on and off devices to operate while the crossheads are moving.

3. In a printing press having a stationary bed, a traveling cylinder; crossheads in which said cylinder is mounted, means on the crossheads for throwing the cylinder on and off impression, crank wheels, and pitmen pivotally connected with the crank wheels and the crossheads for reciprocating the latter to move the cylinders; cams on the pitmen adapted to operate the said throwing on and off means as the crossheads are reciprocated and hold the cylinder off impression on one stroke and on impression on the return stroke.

4. In a printing press having a stationary bed and traveling cylinder cooperating with said bed; crossheads in which the cylinder is mounted; devices on the crosshead for throwing the cylinder on and off impression; and pitmen pivotally connected with the crosshead for reciprocating it; the end of the pitman adjacent the pivotal connection thereof to the crossheads having a cam adapted by the swinging movement of the pitman to cause the said throwing on and off devices to operate while the crosshead is moving and to move and hold the cylinder off impression on one stroke and on impression on the return stroke.

5. In a printing press having a stationary bed and traveling cylinder cooperating with said bed; a crosshead in which said cylinder is mounted; means on the crosshead for throwing the cylinder on and off impression; a crank wheel, and a pitman pivotally connected with the crank wheel and the crosshead for reciprocating the latter, said pitman having a cam on its end adjacent the pivotal connection thereof to the crosshead and actuated by the swinging movement of the pitman to cause the said throwing on and off means as the crossheads are reciprocated to hold the cylinder off impression on one stroke and on impression on the return stroke.

6. In a printing press having stationary beds and traveling cylinders cooperating with said beds; cross heads in which the cylinders are mounted; devices on the crossheads for throwing the cylinders on and off impression; and pitmen pivotally connected with the cross heads for reciprocating them; cams on the pitmen adjacent the pivotal connection thereof to the crossheads whereby the said throwing on and off devices are operated by and during the swinging movements of the pitmen.

7. In a printing press having stationary beds and traveling cylinders cooperating with the beds; crossheads for moving said cylinders; devices on the crossheads for throwing the cylinder on and off impression; and reciprocable pitmen pivotally connected with the crossheads for moving the latter; cams on the pitmen adjacent the pivotal connection thereof to the crossheads actuated by the swinging movement thereof to cause the said throwing on and off devices to operate to move and hold the cylinder off impression

on one stroke and on impression on the return stroke.

8. In a printing press having stationary beds and traveling cylinders, cooperating with said beds; crossheads in which said cylinders are mounted; means on the crossheads for throwing the cylinder on and off impression; crank wheels, and pitmen pivotally connected with the crank wheels and the crossheads for reciprocating the latter to move the cylinders; cams on the pitmen adjacent the pivotal connections thereof to the crossheads actuated by the swinging movement of the pitmen to cause the said throwing on and off means to move and hold the cylinders off impression on one stroke and on impression on the return stroke.

9. In a printing press in combination traveling impression cylinders, a reciprocating cylinder carriage, a crank, a pitman connected at one end to the crank and at the other end to the carriage, the end of the pitman connected to the carriage being formed to provide a suitably shaped cam whereby the rocking of said pitman on the pin connecting it to the carriage will through said cam positively and accurately cause the lifting and lowering of the impression cylinders and hold them in their desired position and time.

10. In a printing press, a traveling impression cylinder, a cylinder carriage, a crank, a pitman connected at one end to the crank at the other end of the carriage, a cam on the pitman and means actuated by said cam whereby the cylinder is moved and locked in thrown off or on position by the action of the cam end of said driving rod as it swings on its pivotal connection to the carriage without the employment of secondary parts or latches to hold same on and off impression.

11. In a printing press, in combination, a frame, a driving crank, a carriage slidably mounted on said frame, an impression cylinder mounted on said carriage, a pitman connected at one end to said crank and at the other end to the carriage, the latter end being cam shaped, and mechanism whereby the impression cylinder is raised and lowered as desired and required by the swinging action of said cam shaped end of the pitman.

12. In a printing press, the combination with a frame, a driving crank, a carriage slidably mounted on said frame, an impression cylinder mounted on said carriage; a pitman connecting said crank to said carriage for reciprocating the same, the end of said pitman connected to the carriage being cam shaped, and means operated by said cam shaped end whereby the swinging movement of the pitman raises and lowers said impression cylinder.

13. In a traveling cylinder printing press, in combination a crank, a reciprocating carriage, an impression cylinder mounted in eccentric bearings in said carriage; a pitman having one end pivoted to the carriage and the other to the crank, the end of the pitman pivoted to the carriage being cam shaped and adapted to rock the eccentric bearings and throw the cylinders on or off impression and hold them in such positions on alternate strokes.

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