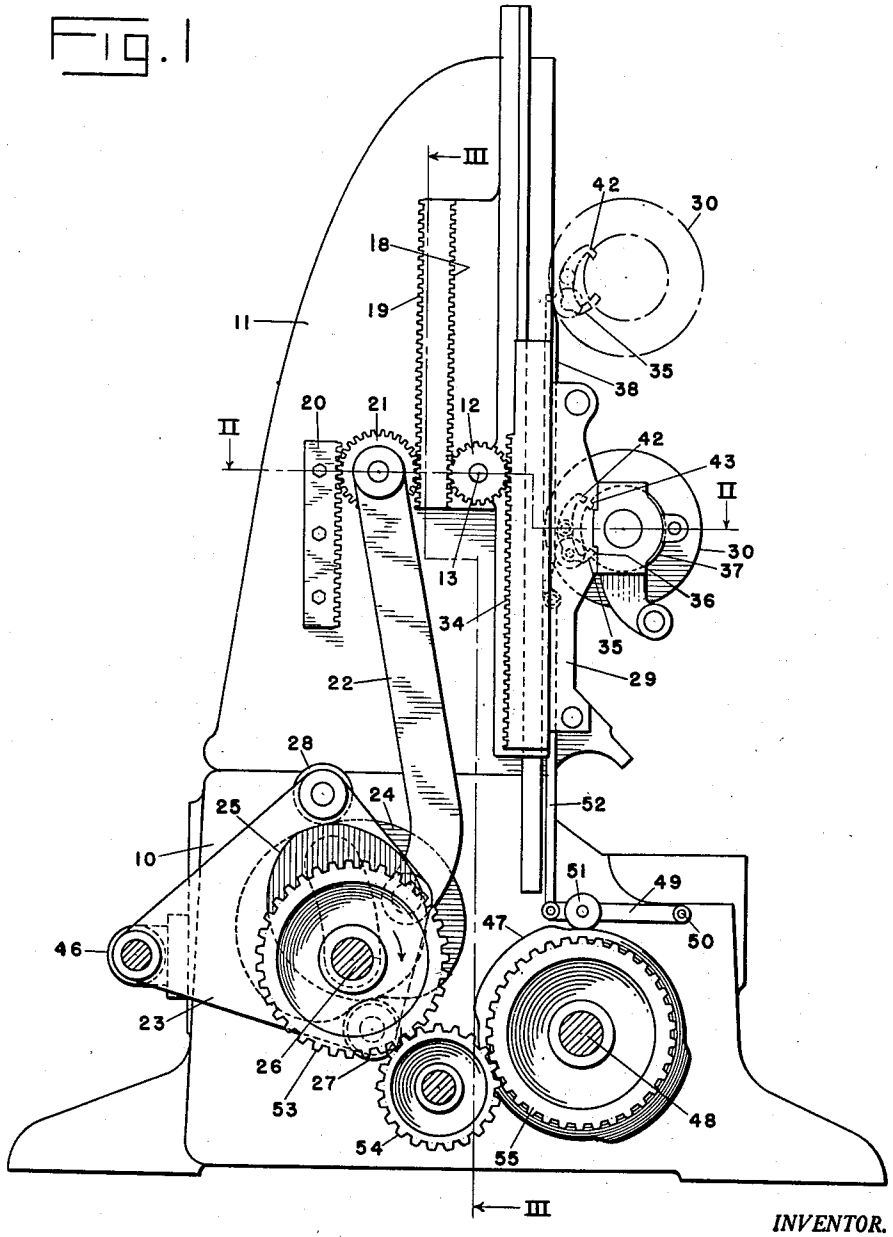
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OPERATING MECHANISM FOR PRINTING PRESSES

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Fig. 1



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Fig. 2

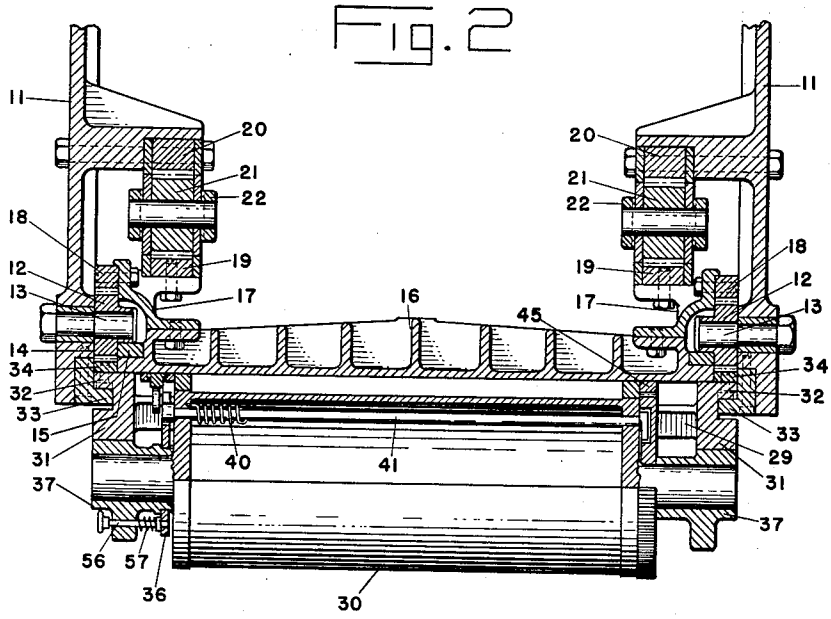


Fig. 3

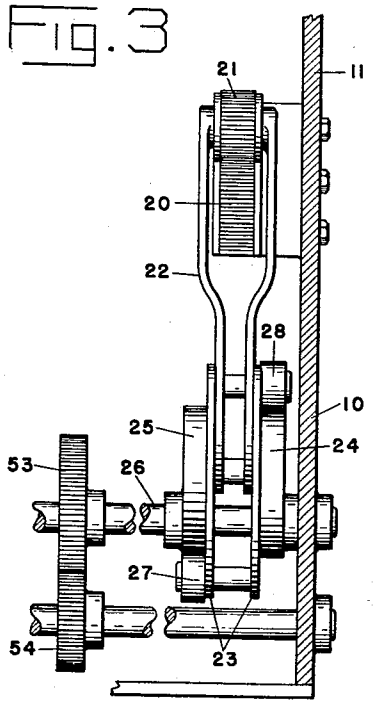
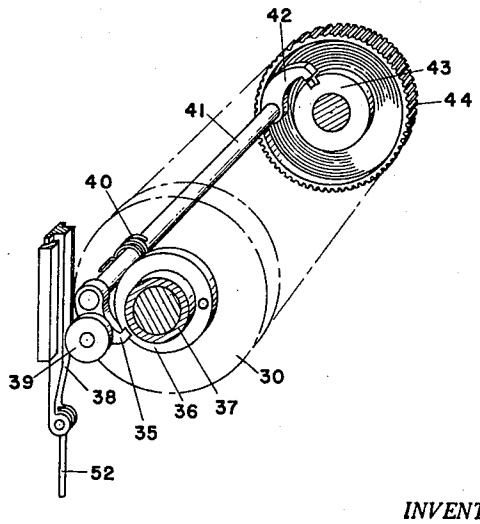


Fig. 4



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OPERATING MECHANISM FOR PRINTING PRESSES

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Application December 28, 1956, Serial No. 631,299

6 Claims. (Cl. 101—282)

This invention relates to printing presses, preferably of the vertical type such as is disclosed in my earlier Patent 1,519,367. More specifically, the invention pertains to operating mechanism for such presses and means whereby a dwell is provided during the period of reversal of the printing couple. The printing couple of vertical presses such as are well known in the trade as the Miehle vertical, include an impression cylinder and a type bed which are mounted for relative linear vertical reciprocation. The cylinder rotates during its up-stroke for the purpose of printing a sheet while, during its down stroke the cylinder remains stationary, in other words, it is held against rotation on its idle stroke during which the sheets are being registered.

The sheets to be printed are placed onto a sheet transfer table which is mounted on the impression cylinder carriage so that the table will follow the reciprocatory movement of the cylinder to its lower and upper positions. Before the cylinder starts its upward travel, after the sheet has been registered, the latter is engaged by the cylinder grippers and printed during the up stroke of the cylinder. When the cylinder has reached its upper position the sheet is taken by the delivery grippers and transferred to the delivery pile.

One of the primary objects of my invention is to provide improved and novel mechanism whereby higher operating speeds and improved printing quality are attained.

A further object is to improve the sheet handling mechanism whereby marking or damaging the edge of the sheets during their transfer from the cylinder by the delivery grippers at high press speeds is avoided.

Another object is to assure perfect registration of the impressions in multicolor work at all speeds.

A still further object is to provide for positive control of the operating mechanism and to eliminate any noise during the engagement and disengagement of the cylinder driving means.

Yet another object of the invention is to provide a simple, durable and economical operating mechanism for printing presses of the class set forth.

Other objects will become apparent from the following description, accompanying drawings and appended claims.

Heretofore, vertical presses in which the type bed and cylinder have relative vertical reciprocatory movement, have been driven by a crank to which one end of connecting rods are pivotally attached while the other ends of such rods are pivoted to the rear of the type bed.

This type of drive has proven quite satisfactory for vertical presses operating at normal speeds, however, at higher speeds, when the cylinder reaches its full linear vertical travel on the up stroke, and its full linear vertical travel on the down stroke, it instantly reverses its travel in the opposite direction causing a shock and inherent vibrations which are detrimental to the resulting quality of printing.

In order to overcome this shortcoming, I have now provided novel means embodied in the driving mechanism which is simple and economical in design and structure, and reliable in its operation, whereby a predetermined period of dwell of the printing couple is accomplished at the points of reversal. The usefulness and advantages of this novel mechanism are fully realized when applied to a vertical type of press. However, the invention is not limited to such specific use and can be readily embodied with similar advantages in other types of presses having a reciprocating bed and/or printing cylinder.

According to my invention, the driving force imparted to the type bed and cylinder for vertical reciprocatory motion is supplied by a cam instead of a crank.

By the use of a cam for the driving force, I find that I cam allow a dwell on the cam surface, whereby, when the cylinder reaches its upper and lower positions, the members of the printing couple come to a complete rest. This is quite essential in the successful operation of high speed presses of the class set forth.

With my improved device, when the cylinder has reached its lower position and the sheet is registered and ready to be taken by the cylinder grippers, the bed and cylinder are at complete rest thereby avoiding disturbance of the registered sheet, which may be due to shocks imparted by the driving mechanism, backlash or other causes such as vibration set up by the engagement of the cylinder driving means.

Moreover, when the cylinder has reached its upper position, the bed and cylinder are also at complete rest, permitting the printed sheet to be taken by the delivery grippers accurately and without damage to the edge of the sheet.

It is evident therefore, that by providing a dwell at the end of each reciprocatory stroke of the bed and cylinder, the intermittent drive for rotating the cylinder, when it is in its lower position, can be mechanically engaged accurately and free from noise. Likewise, when the cylinder is in its upper position, it can be mechanically disengaged during the dwell, positively and free from noise heretofore caused by overthrow of the rotating cylinder.

The provision of a dwell at the end of the cylinder's upward stroke also permits the cylinder drive means to remain in positive engagement with the cylinder until it is brought to rest, thus avoiding shocks and vibrations which result when the cylinder is allowed to overrun the drive means and is stopped abruptly by fixed stops. The cylinder drive is then disconnected during the dwell which follows.

A preferred embodiment of my invention is illustrated in the accompanying drawings, in which:

Figure 1 depicts a fragmentary side elevation of a vertical type printing press;

Figure 2 is a sectional view taken along the planes of the irregular line II—II of Figure 1;

Figure 3 is a detailed view of parts in side elevation as viewed along the line III—III of Figure 1, and

Figure 4 is a perspective view of the latch mechanism actuated when the cylinder reaches its upper and lower positions.

Referring now to Figure 1 of the drawings, the printing press in connection with which my invention is disclosed, merely by way of example, includes a main frame **10** upon which is mounted the way frame **11** which includes two vertically arranged side frame members.

Mounted on the way frame member **11** and extending inwardly therefrom are two gears **12** which are rotatably mounted upon trunnions **13**. Such gears extend through openings **14**, see Figure 2, provided in the way frame members **11** which openings extend but a short distance vertically, it being understood that parts **15** are rigidly associated with the way frame members **11** and act as

ways for the type bed 16 which reciprocates vertically with respect thereto. Secured to the rear of the bed 16, at the sides thereof, are two brackets 17 to which racks 18 are attached at opposite sides of the press. These racks mesh with the gears 12 for driving purposes.

Secured to the two brackets 17 are racks 19 and secured to the way frame 11 are racks 20, see Figures 1 and 2. Meshing with racks 19 and 20 are gears 21 attached to the upper end of connecting rods 22, the lower end of said rods being attached to cam levers 23, see Figure 1, which are pivotally mounted on brackets 46 secured to the main frame 10.

The cam levers 23 are actuated by means of cams 24 and 25, mounted on cam shaft 26, and associated followers 27 and 28, thereby imparting a vertical motion to the type bed 16, also imparting an opposite vertical motion to the cylinder carriage 29 through gears 12.

The impression cylinder 30 is rotatably mounted in the side arms 31 on the cylinder carriage 29, see Figure 2, such arms having lateral extensions 32, which are engaged by vertically extending gibs 33 secured to the way frame members 11 and form the ways for the cylinder carriage 29 whereby the latter may be reciprocated in a vertical direction in proper relationship with respect to the type bed 16.

Secured to the lateral extensions 32 are racks 34, one at each side of the press, which racks mesh with the gears 12.

From this arrangement it is apparent that when the press is in operation, the connecting rods 22 transmit a driving force from the cam shaft 26 through cams 24 and 25 to the gears 21 meshing with the racks 19 and 20 attached to the brackets 17.

Here the driving force is divided, part of it is transmitted directly to the type bed 16 for reciprocating the latter in a vertical direction. The remaining part of the driving force is transmitted from the brackets 17 through the racks 18, gears 12 and racks 34 for reciprocating the cylinder carriage 29 and its cylinder 30 in a vertical direction and in an opposite sense to that of the type bed 16. Accordingly, the power for driving the cylinder 30, and the strains incident thereto, are not transmitted through the type bed 16.

Having particular reference to Figures 1 and 2, it will be seen that when the type bed 16 is drawn downwardly, the cylinder frame 29 will be driven upwardly through the intermediary of racks 18 and 34 and the gears 12. It will be noted that the cams 24 and 25, through cam lever 23 and connecting rod 22, provide the driving force for reciprocating the type bed 16 and the cylinder 30 vertically and in opposite directions.

As depicted in Figure 1, it will be seen that driving cams 24 and 25 rotate in a clockwise direction and as shown, cam roller 28 riding on cam 24 and cam roller 27 riding on cam 25 have just approached the dwell portion of each cam, thereby causing the type bed 16 in its uppermost position and the cylinder 30 in its lowermost position to be at complete rest during the extent of the dwell.

In the earlier type of vertical presses, the driving force for operating them is by means of a crank driven mechanism. By this means, when the bed reaches its uppermost position and the cylinder reaches its lowermost position, they instantly reverse in the opposite direction, providing no dwell for a smooth reversal, particularly at higher press speeds.

Furthermore, when the cylinder reaches its lowest position, the driving pawl for rotating the cylinder engages instantly, causing noise and vibration at the moment when the cylinder grippers are closing on the registered sheet, which of course is highly detrimental especially so in multicolor work where accurate register must be maintained.

When the cylinder reaches its uppermost position, the driving pawl being positive only on its driving side, allows the cylinder to overthrow causing considerable noise and vibration, and requiring some type of bumper to stop its rotation. This is also apt to cause damage to the edge of the printed sheet when taken by the delivery grippers to be transferred to the delivery pile.

With reference to Figures 1 and 4 it will be seen that during its downward stroke the cylinder 30 is held stationary by the pawl 35 which is engaged in the stationary one tooth ratchet 36 mounted on the hub of the cylinder journal box 37.

During the dwell period of driving cams 24 and 25 the pawl control cam 38 is moved upwardly thereby permitting the cam follower 39 to move to the low part of the cam, under the influence of the torsion spring 40 mounted on the rotatable pawl supporting shaft 41, which motion causes the pawl 35 to move clockwise, out of engagement with the tooth of ratchet 36. Simultaneously, the drive pawl 42 is moved to engage the one tooth ratchet 43 secured to the inside surface of the cylinder drive gear 44. The latter is rotatably mounted on the cylinder journal box 37. Thus, as the cylinder carriage moves upwardly, rotary motion is imparted to the cylinder by the drive gear 44 which meshes with a rack 45 mounted on the front face of the bed 16 and the pawl 42 is maintained in positive engagement with the ratchet 43 by the resilient tension of spring 40.

As the carriage reaches the end of its upward stroke the drive means effectively retard the cylinder and cause it to stop without shock or vibration as the drive cams 24 and 25 enter the period of dwell. The sheet is then released by the cylinder grippers and taken by delivery grippers and conveyed to the delivery pile.

During the dwell period at the top of its stroke, the cam 38 is again moved upwardly as indicated in Figure 1, bringing the high part of said cam under the cam follower 39. This moves the pawl counterclockwise against the tension of spring 40 into engagement with the stationary ratchet 36 and releases drive pawl 42 from the drive ratchet 43.

It will be noted that as the cylinder moves downwardly the follower 39 remains in contact with the raised portion of cam 38 and therefore pawl 35 is maintained in engagement with ratchet 36. During this movement of the cylinder, cam 38 drops to its lower position, without effecting any motion of the pawl 35, so as to be in position to release pawl 35 during the dwell period at the bottom of the cylinder stroke.

Movement of the pawl control cam 38 is effected and controlled by a timing cam 47, secured to the cam shaft 48. This cam actuates a lever 49 which is pivoted at 50 and which carries a cam follower 51. Motion of the lever 49 is transmitted to cam 38 through a connecting rod 52. The cam shaft 48 is driven from the main drive shaft 26 through the drive gear 53, the idler gear 54 and the cam shaft gear 55.

With particular reference to Figure 2, it will be noted that the stationary ratchet 36 is rotatably mounted on the journal box 37 and is secured against rotation by the spring actuated pin or plunger 56 which is slidably mounted in the journal box 37 and normally engages a recess formed in the face of the ratchet. When it is desired to rotate the cylinder manually for the purpose of make ready or to apply the tympan, the pin 56 is withdrawn from the ratchet 36 against the pressure of spring 57 so that the ratchet is free to rotate with the cylinder. Upon completion of the make ready, pin 56 is released to re-engage ratchet 36 and the press is then ready for operation.

It is evident that a mechanism with which a rest or dwell period can be accomplished at the end of each stroke, will produce very important advantages such as improved register, elimination of objectionable noise, more accurate delivery of printed sheets, and positive control of the impression cylinder at higher press speeds.

While I have illustrated and described a preferred embodiment of my invention, I wish it to be understood

that I intend to cover all modifications which will fall within the scope and meaning of the appended claims.

What I claim is:

1. In a printing press having a printing couple comprised of a type bed, a cooperating impression cylinder, driving mechanism whereby to reciprocate said bed and cylinder in opposite directions, and means included in said mechanism whereby during the reversal period of the printing couple, the bed and cylinder are given a predetermined dwell, said mechanism including at least one cam member whereby the dwell period is controlled, and locking means whereby the impression cylinder is secured against rotation during the period of dwell.

2. In a printing press as set forth in claim 1, in which the locking means include latch mechanism associated with the impression cylinder, and a timing cam whereby said mechanism is actuated at predetermined intervals.

3. In a printing press as set forth in claim 2, in which the latch means comprises two ratchets and two pawl members associated therewith, the latter being actuated during the dwell of the cylinder at each end of its stroke.

4. In a printing press of the class having a type bed and an impression cylinder carriage mounted for reciprocation in opposite directions, the provision of driving mechanism comprising a first rack mounted on said carriage, a second and third rack carried by said bed, a fourth rack secured to the frame of the press, a driving pinion meshing with said first and second racks, and a driving pinion meshing with said third and fourth racks, said latter pinion having associated therewith driving mechanism, including cam means for bodily repicrocatin gsaid latter pinion whereby to impart relative reciprocating motion to said type bed and impression cylinder carriage.

5. In a printing press having a type bed and a coacting

impression cylinder, drive mechanism for reciprocating said bed and cylinder in opposite directions and including rotary cam means adapted to provide an extended, predetermined period of dwell at the end of each stroke of said cylinder, gear means for rotating said cylinder during each alternate stroke thereof, pawl means for engaging and disengaging the cylinder with said gear means, and means for actuating said pawl means during the respective dwell periods.

6. In a printing press the combination of a type bed and an impression cylinder carriage mounted in the press frame for relative reciprocating motion in opposite directions, a rack on said carriage and a rack on said bed, a pinion gear meshing with said racks, a second rack on said bed, a stationary rack on the press frame, a second pinion gear meshing with said second rack and said stationary rack, and mechanism for bodily reciprocating said second pinion gear to impart relative reciprocating motion to said bed and cylinder, said mechanism comprising an oscillatable lever, a member connected between said lever and said second gear, and a pair of conjugate cams for oscillating said lever, said cams being adapted to provide an extended, predetermined period of dwell at the end of each stroke of said bed and carriage.

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