To all whom it may concern:

Be it known that we, BURT D. STEVENS and JOSEPH R. BLAINE, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Printing-Press Tripping Devices, of which the following is a specification.

This invention relates to sequential trip for multi-cylinder printing presses and especially for the type of press known as a two-color press in which the same side of the sheet receives two successive impressions from the respective cylinders.

In the tripping mechanism of presses of this character it is desirable that the construction be such that the tripping of one of the cylinders will follow automatically at a later and definite period with reference to the time of tripping the other as well as so that one cylinder may be tripped separately or independently of the other.

The primary object of this invention is to provide an improved automatic sequential tripping mechanism of the described character for plural cylinder multi-color presses or of presses having a plurality of cylinders for respectively printing a portion of the same side of a sheet.

In order that the invention and the manner of its operation may be readily understood preferred and modified embodiments thereof are set forth in the accompanying drawings and in the description based thereon. As, however, the invention is capable of further modification without departing from the essence thereof or sacrifice of its material advantages it is to be understood that the drawing and the description are to be taken in an illustrative rather than in an unnecessary limiting sense.

In the drawings—Figure 1 is a side elevation showing a portion of a printing press provided with these improvements with the parts in the normal position; Fig. 2 is a fragmentary view partly in section showing the tripping mechanism with the parts in the position assumed for tripping the first cylinder; Fig. 3 is a similar view showing the parts in the position assumed upon the tripping of the second cylinder; Fig. 4 is a detail in top plan showing the locking mechanism which is similar for both cylinders; Fig. 5 is a vertical section through the parts shown in Fig. 4; Fig. 6 is a transverse section on the line 6—6 of Fig. 5; Fig. 7 is a fragmentary side elevation partly in section showing a modified form of construction; Fig. 8 is an enlarged detail of a portion of the sequential trip showing in full and dotted lines the successive positions of the parts; and Fig. 9 is an edge view of the parts shown in Fig. 8.

In cylinder printing presses where the cylinder undergoes a rising and falling motion with respect to the bed, the cylinder raising and lowering mechanism usually embodies a spring for moving the cylinder in one direction and positive means such as an eccentric or toggle for moving it in the other direction. The raising and lowering mechanism forms no part of the present invention, but in the present instance springs 11 and 12 are shown as employed in connection with each of the cylinders 13 and 14 whose journals 15 are supported in boxes 16 arranged in suitable guides 17. Between the impression cylinders 13 and 14 is arranged the transferring cylinder 18, the function of which is to transfer the sheet from the first cylinder 13 to the second cylinder 14 in a way which will result in the second cylinder producing an impression upon the same side of the sheet as that upon which the first cylinder produced its impression.

The lowering and tripping mechanisms for the two cylinders are quite similar in construction and operation the differences consisting of means whereby the tripping of the second cylinder is deferred until the sheet which was printed by the first cylinder passes and receives an impression from the second cylinder. Because of the similarity of the lowering and tripping mechanisms the same reference numerals will be employed where corresponding parts are identical and it will be understood that the description applies equally to the mechanism of each of the cylinders.

Above the boxes 16 of the cylinders 13 and 100 are arranged eccentrics 19 in bearing 20 which serve to lower the cylinders into impression or printing position when the eccentrics are rotated in their bearing blocks, this being done through the agency of crank arms 21 and connecting rods 22 whose lower ends are pivoted to crank arms 23 loosely mounted on a rocker shaft 24 ad-
There is employed a coupling connection between rocker shafts 23 and 24 such as that shown in patent to R. Miehle, 1,081,620, issued December 16, 1913, such connection forming no part of the present invention and for that reason not being illustrated herein and for the further reason that it is disposed between the side frames of the machine and would not be visible.

Leaving now those portions of the lowering and tripping mechanism for the respective cylinders which are not in themselves new and which for the two cylinders are similar in their operation, we will now describe the actuating means by which the tripping devices are put into operation.

On the rock shaft 24 of the tripping device for the first cylinder 13 is rigidly secured a lever 25 on the outer end of which is pivoted at 26 an operating rod 27, the upper end of which is guided within a sleeve 28 rotatably mounted within the feeder platform 29 and provided with a locking head 30 having a foot piece 31. One wall of the sleeve 28 is longitudinally slotted at 32 and its lower edge is provided with an undercut portion 33 extending laterally from the slot 32. The rod 27 is provided with a stud 34 which is guided within the slot 32 and the said rod is also provided with a collar 35 adjustable mounted upon the rod 27 by means of a set screw 36.

On the rock shaft 24 of the tripping device for the second cylinder 14 is secured a lever 37 the forward end of which has pivoted thereto at 38 an operating rod 39 the upper end of which is guided within a sleeve 40 rotatably mounted in the feeder platform 29 and provided with a locking head 41 and a foot piece 42. The wall of this sleeve is provided with a vertical slot and undercut portion corresponding in all respects to the sleeve 28 while the operating rod 39 has upon its upper end a similar stud and also has mounted thereon a collar 43 adjustable held by set screw 44. The lever 37 may advantageously be guarded against lateral vibration by confining the same within a bifurcated extension 45 of the lever 25.

A spring 46 secured to the machine frame at 47 and to the lever 25 at 48 holds the lever 25 normally in its upper position which corresponds to the printing position of the cylinder 13 while the spring 49 secured at 50 to a bracket 51 of the machine frame and to the lever 37 at 52 similarly holds the said lever 37 in its normal upper position.

A disk 53 mounted upon the shaft 54 driven by any suitable mechanism in synchronism with the cylinder 13 has a laterally extending marginal flange 55 interrupted at one point to provide a gap 56. At 57 is pivot a trip arm 58 carrying a roller 59, extending laterally therefrom into the plane of the flange 55 of the disk 53. Normally the roller 59 travels upon the inner face of the said flange 55 as shown, the trip arm having a projection 60 which in the perpendicular position of the said arm bears upon the upper edge of the lever 37, the arm being free to yield in an opposite direction against the spring 61.

An operating key 62 provided with a head 63 is guided for vertical movement within the feeder platform 29 and has a stem 64 extending downwardly and with its lower end guided in an apertured bracket 65 carried by the levers 25. Upon the lower side of the platform 29 is secured a locking plate 66 the edge of which is adapted to engage within a notch 67 formed in the side of the key 62 whereby to lock the same in its depressed position, the bearing of the key within the platform 29 being sufficiently loose to permit of lateral movement of the key into and out of engagement with the locking plate.

Upon the stem 64 of the key is mounted a collar 68 adjustable thereon by means of the set screw 69.

A floating lever 70 having rounded bearing points 71 and 72 upon its lower face at its ends and a rounded bearing point 73 upon its upper face in its central portion and transversely aperture at 74, 75 and 76 in line with the bearing points respectively, is arranged upon the operating rods 27 and 39, and the key stem 64 with the bearing points 71 and 72 resting upon the collars 48 and 53 respectively and the bearing point 73 bearing upwardly against the collar 68.

The operation of the tripping mechanism is as follows: Assuming the parts to be in the normal position indicated in Fig. 1, it being the wish of the feeder to trip the two cylinders in proper sequence he steps upon the head 63 of the key and the same is depressed to the position indicated in Fig. 2. The lever 37 being held against movement by the bearing of the roller 59 upon the flange 55 of the cam disk the operating rod 39 cannot be depressed and consequently the floating lever 70 is supported by the collar 43 as a fulcrum and the force exerted upon the center of the lever by the collar 68 causes the opposite end of the lever to move downwardly to the position shown and acting upon the collar 68 depresses the outer end of the lever 25 thereby rocking the shaft 24 and tripping the first cylinder 13.

The upward force exerted upon the depressed end of the lever 70 through the rod 27 by the spring 46 acting on the lever 25 is transmitted through said lever, using the collar 68 as a fulcrum, to press the rod 125 downwardly which tendency is resisted by the roller 59 bearing upon the inner face of the flange 55. As the disk 53 continues to rotate in the direction indicated by the arrow the gap 56 reaches a point below the 130
roller 59 and the latter drops through said gap to the position indicated in Fig. 3. This releases the lever 37 and the weight of the feeder upon the key head depresses the same to the position shown in said Fig. 3 thus rocking the shaft 24 of the second cylinder and tripping the same.

When the foot of the operator is removed from the key head the spring 46 will immediately restore the lever 25 to its original position the floating lever 70 assuming the position shown in dotted lines in Fig. 3 and the key the position shown in dotted lines in said figure, the lever 37 and its operating rod 39 remain in the depressed position until the cam disk 33 has completed the revolution and the gap 56 in the flange 55 of the same again comes in line with the roller 59 whereupon the force exerted by the spring 49 will lift the roller through the gap into its former position within the disk as shown in Fig. 2. The yielding mounting of the trip arm 55 permits the same to yield to the right and prevent any injury if the same should be struck by the edge of the flange while passing through the gap in an upward direction.

If it is desired to continuously trip both of the cylinders the operator will push the operating key to the left so that its notch 67 will be engaged by the locking plate 66 in which event the floating lever 70 will be retained in the position shown in Fig. 3 with the levers 25 and 37 depressed against the tension of their springs 46 and 49. If he wishes to continuously trip but one of the cylinders he will, by means of his foot, engage the foot piece 31 for instance and thereby angularly turn the sleeve 28 whereby the lug 34 will be caused to engage beneath the undercut portion 33 of the sleeve thus holding the operating rod 27 in its depressed position and causing the cylinder 13 to be maintained in the tripped position; or he will angularly turn the sleeve 40 by means of the toe piece 42 causing the corresponding lug of the operating rod 39 to engage beneath the corresponding undercut portion of the sleeve 40, in which case the rod 39 will be held in its depressed position and the cylinder 14 retained out of contact with the printing plate while the first cylinder remains in printing relation to the same.

In Figs. 7 to 9 inclusive is shown a slightly modified form of construction. Herein the construction and operation of the parts are substantially the same with the exception that the floating lever 70 is pivoted at 77 to the stem 64 of the operating key whereby the collar 68 and the bearing point 73 are dispensed with. An adjusting stop 75 is also provided whereby to limit the downward movement of the lever 25, this lever being also provided in its bifurcated portion with a lug 79 which limits the upward movement of the lever 37. The spring 49 also is shifted from its position toward the pivotal point of the lever 37 to a position indicated at 49a closely adjacent to the spring 46 having its point of attachment to the lever 37 at 52a and to the machine frame at 50a. In this form of construction a different cam mechanism is employed for the tripping of the second cylinder 75 in proper sequence to the tripping of the first cylinder. Upon the shaft 80 driven in synchronism with the cylinder 13 is mounted a cam 81 having a high part 82 at one portion of its periphery. To the machine frame 89 is pivoted at 83 a trip arm 84 carrying a roller 85 which is held by means of a suitably anchored spring 86 in contact with the face of the cam 81. This trip arm 84 has also a lug 87 projecting laterally therefrom. Upon the lever 37 is fixed a block 88 which is also provided with a laterally-extending lug 89 which in the normal position of the lever 37 lies immediately above the lug 87 of the trip arm whereby the lever 37 is normally sustained in an elevated position and in the tripping position of the lever 37 the lug 89 will occupy a position directly beneath the lug 87.

The operation of this form of the device is in general the same as that previously described, however, when the first cylinder is tripped the lug 87 resists the tendency of the lever 37 to drop under the weight of the operator until the high point 82 of the cam 100 engages the roller 85 and swings the trip arm 84 to the right causing its lug 87 to pass from beneath the lug 89 whereupon the lever 37 is allowed to drop and immediately thereafter the portion 82 of the cam having cleared the roller 83 the trip arm swings back to its normal position and the lug 87 engages over the lug 86 thereby retaining the lever 37 in its lowered position until the cam has completed its revolution whereupon it again pushes the roller 85 to one side and permits the lug 89 to pass to a position above the lug 87 and the lever 37 to rise to its normal position as shown in Fig. 7.

We claim:

1. In a multi-cylinder press, the combination of separate means to trip the respective cylinders, and a single manually operable actuating device common to the several cylinder-tripping means for individually actuating the same.

2. In a multi-cylinder press, the combination of separate means to trip the respective cylinders, a single actuating device common to the several cylinder-tripping means for individually actuating the same, and means to prevent actuation of one of the cylinder-tripping means.

3. In a multi-cylinder press, the combination of separate means to trip the respective cylinders.
cylinders, a single actuating device common to the several cylinder-tripping means for individually actuating the same, and means to prevent actuation of any one of the cylinder-tripping means.

4. In a multi-cylinder press, the combination of separate means to trip the respective cylinders, a single actuating device common to the several cylinder-tripping means for individually actuating the same, and means to prevent the actuation of either or both of the cylinder-tripping means.

5. In a multi-cylinder press, the combination of separate means to trip the respective cylinders, a single actuating device common to the cylinder-tripping means for individually actuating the same, and means normally preventing actuation of one of the cylinder-tripping means and driven by the actuating device. press to release said cylinder-tripping means and permit actuation thereof by the actuating device.

6. In a multi-cylinder press, the combination of separate tripping mechanism for the two cylinders, a floating lever having its two ends bearing on the two tripping mechanisms, and an operating key bearing on the lever intermediate its ends, means to resist the action of the floating lever on the tripping mechanism of the second cylinder, and means to release the resistance in proper timed sequence to the tripping of the first cylinder, substantially as described.

7. In a multi-cylinder press, the combination of a tripping lever for each cylinder, an operating rod connected to each lever, a floating lever having its two ends bearing on the two rods, and an operating key bearing on the floating lever intermediate its ends, means to resist the action of the floating lever on the tripping mechanism of the second cylinder, and means to release the resistance in proper timed sequence to the tripping of the first cylinder, substantially as described.

8. In a multi-cylinder press, the combination of a tripping lever for each cylinder, an operating rod connected to each lever, a stop mounted on each rod, an operating key mounted with its stem between the two rods, a floating lever having its two ends bearing on the stops, a connection between the key stem and the medial portion of the floating lever, means to resist the action of the floating lever on the tripping mechanism of the second cylinder, and means to release the resistance in proper timed sequence to the tripping of the first cylinder, substantially as described.

9. In a multi-cylinder press, the combination of a tripping lever for each cylinder, an operating rod connected to each lever, a stop mounted on each rod, an operating key mounted with its stem between the two rods, a floating lever having its two ends bearing on the stops, a loose connection between the key stem and the medial portion of the floating lever comprising a stop on the stem bearing downwardly on the lever, manually operable means to lock the key in depressed position, means to resist the action of the floating lever on the tripping mechanism of the second cylinder, and means to release the resistance in proper timed sequence to the tripping of the first cylinder, substantially as described.

10. In a multi-cylinder press, the combination of a tripping lever for each cylinder, an operating rod connected to each lever, a stop mounted on each rod, an operating key mounted with its stem between the two rods, a floating lever having its two ends bearing on the stops, a connection between the key stem and the medial portion of the floating lever, separate manually operable means to lock each of the rods in depressed position, means to resist the action of the floating lever on the tripping mechanism of the second cylinder, and means to release the resistance in proper timed sequence to the tripping of the first cylinder, substantially as described.

11. In a multi-cylinder press, the combination of a tripping lever for each cylinder, an operating rod connected to each lever, a stop mounted on each rod, an operating key mounted with its stem between the two rods, a floating lever having its two ends bearing on the stops, a connection between the key stem at the medial portion of the floating lever, separate manually operable means to lock the key and each of the rods in depressed position, means to resist the action of the floating lever on the tripping mechanism of the second cylinder, and means to release the resistance in proper timed sequence to the tripping of the first cylinder, substantially as described.

12. In a multi-cylinder press, the combination of a tripping lever for each cylinder, an operating rod connected to each lever, a floating lever having its two ends bearing on the two rods, and an operating key bearing on the floating lever intermediate its ends, means to resist the action of the floating lever on the tripping mechanism of the second cylinder, means to release the resistance in proper timed sequence to the tripping of the first cylinder, said resisting and releasing means comprising a trip arm carried by the trip lever, means to engage the arm and retain the lever out of tripping position, and means actuated by the cylinders to release the trip arm and permit the lever to respond to the impulse of the floating lever, substantially as described.

13. In a multi-cylinder press, the combination of a tripping lever for each cylinder, an operating rod connected to each lever, a floating lever having its two ends bearing on the stops, a loose connection between the key stem and the medial portion of the floating lever comprising a stop on the stem bearing downwardly on the lever, manually operable means to lock the key in depressed position, means to resist the action of the floating lever on the tripping mechanism of the second cylinder, and means to release the resistance in proper timed sequence to the tripping of the first cylinder, substantially as described.
on the two rods, and an operating key bearing
on the floating lever intermediate its ends,
means to resist the action of the floating
lever on the tripping mechanism of the sec-
ond cylinder, means to release the resistance
in proper timed sequence to the tripping of
the first cylinder, said resisting and releas-
ing means comprising a disk having an in-
terrupted laterally extending flange and
driven in isochronism with the cylinders, a
trip arm carried by the tripping lever and
having a member traveling on the inner face
of the flange and adapted to drop through
a gap in the flange to release the trip arm
and permit the lever to respond to the im-
pulse of the floating lever, substantially as
described.

14. In a multi-cylinder press, the combi-
nation of a tripping lever for each cylinder,
an operating rod connected to each lever, a
stop mounted on each rod, an operating key
mounted with its stem between the two rods,
a floating lever having its two ends bearing
on the two stops, a loose connection between
the key stem and the medial portion of the
floating lever comprising a stop on the stem
bearing downwardly on the lever, manually
operable means to independently lock the
key and each of the rods in depressed posi-
tion, means to resist the action of the float-
ing lever on the tripping mechanism of
the second cylinder, and means to release the
resistance in proper timed sequence to the
tripping of the first cylinder, said resisting
and releasing means comprising a disk hav-
ing an interrupted laterally extending flange
and driven in isochronism with the cylin-
ders, a trip arm carried by the tripping
lever, a roller mounted on the arm and trav-
eling on the inner face of the flange and
adapted to drop through the gap in the
flange to permit the tripping lever to re-
spond to the impulse of the floating lever,
substantially as described.

In testimony whereof we have hereunto
signed our names in the presence of two
witnesses.

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