C. F. ROOT.

LINK MOTION.

APPLICATION FILED MAR. 14, 1914.

1,167,114.

Patented Jan. 4, 1916.

2 SHEETS—SHEET 1.

Fig. 1.

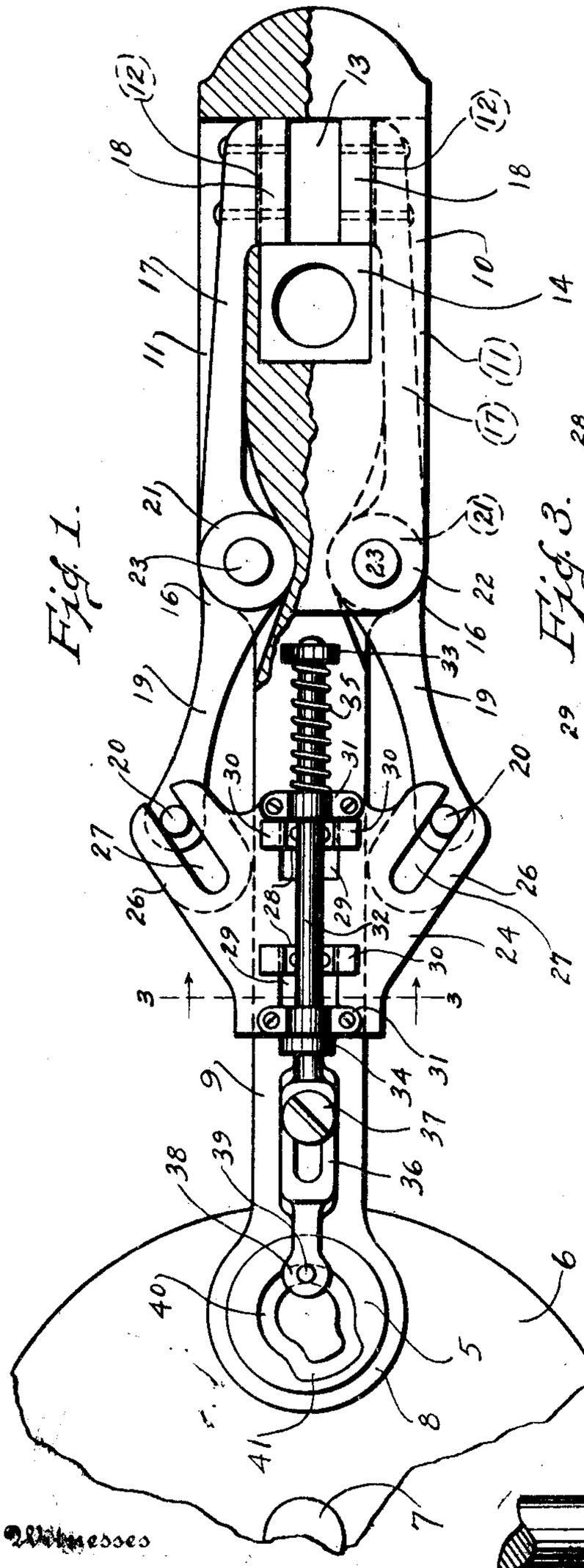
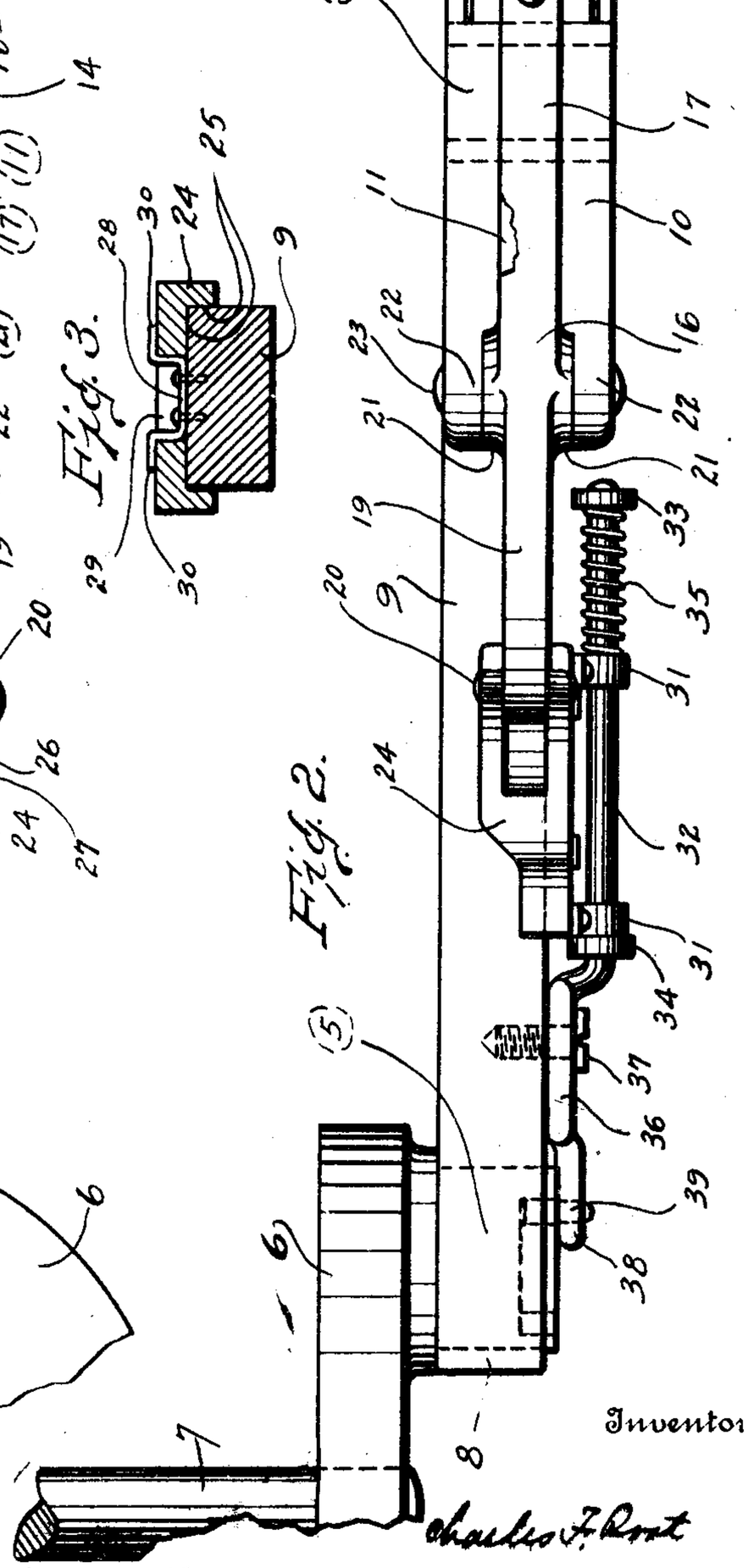


Fig. 3.

Fig. 2.



Witnesses

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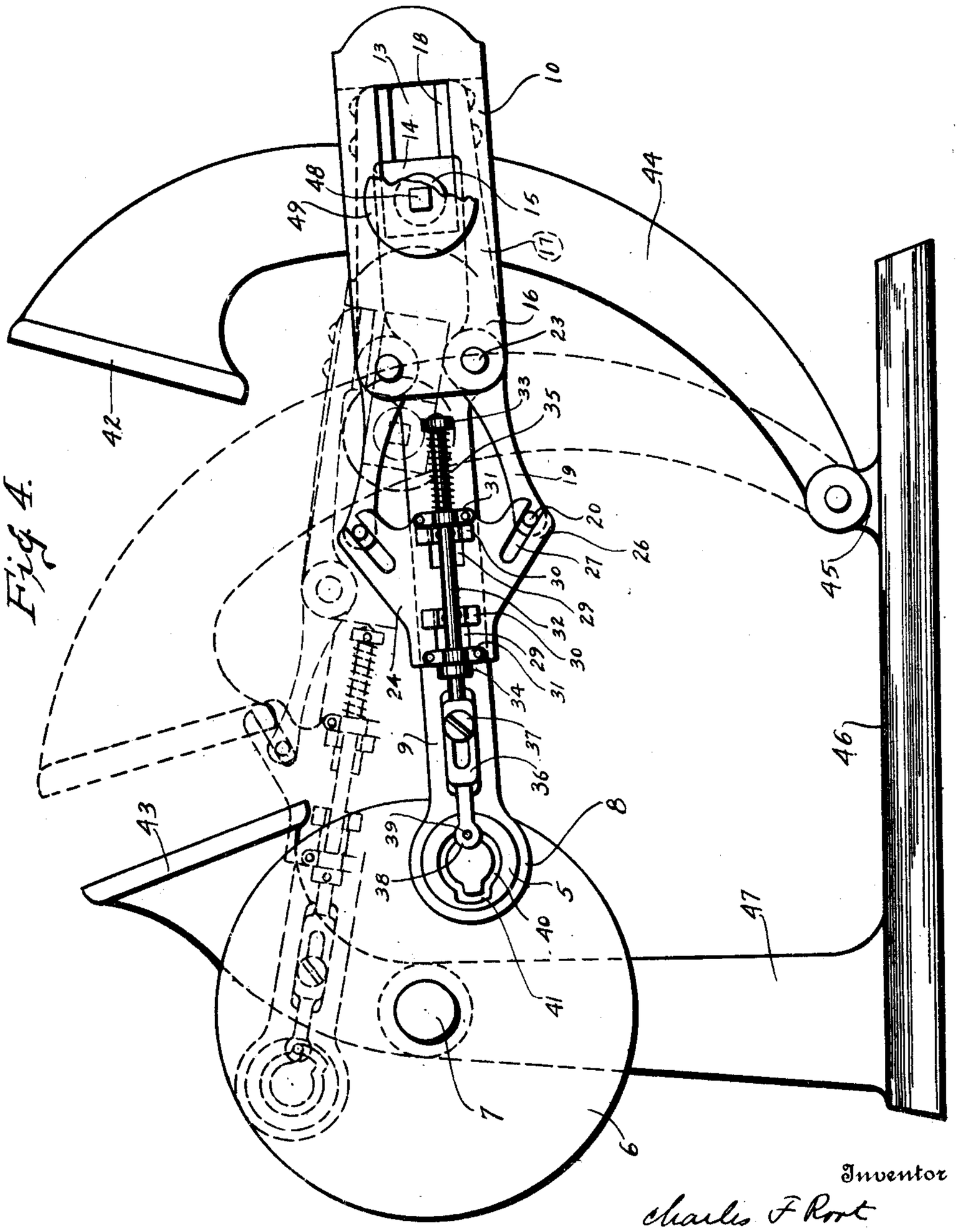
2 SHEETS—SHEET 2.

Fig. 4.



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UNITED STATES PATENT OFFICE.

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LINK-MOTION.

Specification of Letters Patent. Patented Jan. 4, 1916

1,167,114.

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To all whom it may concern:

Be it known that I, CHARLES F. ROOT, a citizen of the United States of America, residing at Ravenna, in the county of Portage and State of Ohio, have invented certain new and useful Improvements in Link-Motions, of which the following is a specification.

This invention has reference to link motions, and proposes, briefly, an improved device or mechanism of the character specified, the component members of which are so constructed and arranged that the element to be reciprocated is released for a definite period during each movement thereof in one direction.

An embodiment of the invention is illustrated in the accompanying drawing, whereof:

Figure 1 is a fragmental part-sectional side elevation; Fig. 2 is a plan view; Fig. 3 is a slightly-enlarged transverse section taken on line 3—3, Fig. 1; and Fig. 4 is a view in side elevation, representing the mechanism applied to a printing press and showing the movable jaw or platen of the press both as engaged with and released by the clutch member of the said mechanism.

Referring more particularly to Figs. 1, 2 and 3, of the said drawing, the improved mechanism is shown as operated, from a crank-pin 5 fixed to a suitable disk 6 which is mounted on a drive shaft 7, this pin being loosely engaged in an eye 8, or the like, provided upon one end of a rod or elongated link 9 that constitutes the main member of the aforesaid mechanism. At its other end, link 9 is formed with an enlarged head 10, in whose top and bottom are provided longitudinal slots 11 that open at their forward ends 12 into a central recess 13, this recess, however, being about half the length of the said slots, which latter extend, approximately, from end to end of the head. The recess opens through the opposite sides of the said head and is designed to act as a slideway wherein works a bearing block 14 that is revolubly fitted upon a stud or pin 15 provided upon the element to be reciprocated, the arrangement being such that the latter will not only be caused to follow the rod during its two strokes or movements in opposite directions, but will also be capable of a limited play or movement independent of and relatively to said rod during one stroke, as subsequently explained. At the points 12 where the recess and the two slots intersect, the latter are slightly widened, as is shown in Fig. 2.

The effective connection of the bearing block 14 to, and its release from, the link are preferably through the agency of a clutch which, in the construction illustrated, embodies a pair of oppositely-acting two-armed levers 16 whose long, front arms 17, work in the slots 11 and are provided at their forward ends with gags 18 that are movable through the enlarged ends 12 of said slots into and out of the forward portion of the recess 13. The short, rear arms 19 of these levers carry cross-pins 20, and at the junction of their said arms with the first-mentioned arms 17, the levers are provided with knuckles 21 which fit between pairs of knuckles 22 at the rear end of the head, the adjacent knuckles being connected by cross-pins or pintles 23 that constitute the fulcra about which the levers rock. The length of the afore-mentioned recess 13, wherein the sliding bearing block 14 works is such that it is exactly equal to the combined length of said block and one of the lever gags 18. In consequence of this construction, it will be apparent that when both gags have been moved into the recess, the block will be clamped or held against the rear wall of the recess and, hence, prevented from moving, so that the element which carries the block will, accordingly, be clutched to the link and will move backward and forward with the same. On the other hand, when the levers have been so rocked as to withdraw the gags from said recess, their clutch action upon the block will cease, and the latter will be allowed a forward movement, (to the right), relatively to the link until it strikes the forward end of the recess.

To operate the levers, there is provided, in the present embodiment of the invention, a cam 24 which is mounted to slide upon link 9, (being provided for that purpose with a seat 25, Fig. 3, wherein said link conformably fits) and which is constructed with a pair of divergent branches 26 that project in the direction of head 10 and are formed with longitudinal slots or bifurcations 27 for the reception of the cross-pins 20. This cam is held against displacement from the link by means of a pair of U-shaped straps

28, which are riveted to the latter and work in short longitudinal slots 29 in the cam, the out-turned ends 30 of the strap arms bearing against the outer face of the said cam, as shown in Fig. 3. Adjacent to these straps, the cam carries a pair of bearings 31, through which extends an endwise-movable rod 32 that projects in opposite directions beyond the cam ends, the rod being provided with a pair of collars 33 and 34. The collar 33 is located at the front end of the rod, and has interposed between it and the front bearing 31 an expansible coil spring 35 that serves to yieldingly draw said rod forward, while the other collar 34 is located behind cam 24 and held against the rear bearing 31, by the action of said spring. To the rear of the cam, the rod is formed with an elongated eye 36 through which extends a headed bolt or stud 37 which is affixed to the link, and at the rear end of said rod there is provided a head 38 to which a pin 39 is attached, the said pin projecting into a closed cam groove 40 cut into the outer end face of the crank-pin 5, which groove is formed with a high part 41 at a greater distance from the axis of the crank-pin than the remaining portion of the groove.

The operation of the invention is best explainable in connection with some concrete application thereof, as shown for example, in Fig. 4, wherein it is represented as employed to effect the reciprocation of the movable gag or platen 42 of a printing press, toward and from the fixed gag or bed 43, but it is to be understood that this is merely one of the uses to which the invention may be put, and that no limitation to such use alone is contemplated. In this construction, the movable gag or platen is depicted as carried by an arm 44 pivoted at its lower end to a bracket 45 mounted on the base 46 of the press, and the fixed gag or platen as carried by a standard 47 likewise mounted on said base. The stud 15 is shown as affixed to said platen intermediate the ends of the latter, and as carrying a screw 48 and washer 49, by means whereof the block 14 and head 10 are held in place. The drive shaft 7 is assumed to be rotating in a counter-clockwise direction, and the normal position of the parts at the commencement of the rearward or left-hand stroke of the rod is as shown in full lines in Fig. 4, the block 14 being at such time clamped in place at the rear end of the recess 13 by the action of the gags 18 on the clutch levers 16, which latter are then closed. Also, the pin 39 on rod 32 is engaged in the concentric or low portion of the cam groove 40, so that said rod will then move in unison with the main rod or link 9. The pins 20 are located adjacent the outer ends of the slots 27 in the arms 26 of cam 24. As the movement in question continues, the several parts will remain in their respective positions until pin 39 leaves the low part of the cam groove and starts to enter the high part 41, this taking place just about the time that the platen reaches its dotted line position, in practice about two or three inches from the bed. At this point the relative positions of the cam groove and the rod 32 have changed, the high part 41 gradually assuming a position where it tends to point forwardly, or toward the movable gag. This change acts to exert an endwise forward pressure upon rod 32, with the result that the latter is pushed forwardly, and, in turn, forces cam 24 to slide in the same direction upon rod 9, owing to the engagement of collar 34 with the rear end of the cam. As said cam is forced forward, its slotted arms 26 draw the rear arm 19 of the clutch levers together, thereby producing a divergent movement of the front arms 17 and causing their gags 18 to release block 14, which is then free to move into position at the rear end of recess 13.

The link 9 continues its stroke whether or not there is an obstruction between the gags, but if an obstruction should come between the stationary and movable gags, then the movable gag or platen will stop and remain stationary in its dotted line (partially closed) position. When this takes place, the link 9 slides the block 14 over into the forward portion of the recess 13, but the said link continues its movement until it reaches a predetermined position, at which point the block 14 is in its forward position and the gags 18 can not move to their locked position, as they would come in contact with the said block.

As the pin 39 of the rod 32 is engaged with the cam, movement is imparted to the rod 32 which compresses the spring 35 instead of moving the cam 24 on the rod. As the main rod 9 completes its stroke, the pin 39 leaves the high part of the cam groove, and reënters the concentric or low part, whereupon cam 24 if the space between the gags and the driving member is free from obstruction is forced backward by the action of spring 35 and closes the clutch levers, whereupon the block 14 is again engaged by the lever gags and the platen caused to close against the bed. The parts are returned to initial position, as will be understood, during the forward stroke, but the clutch levers, however, remain closed, since they are opened once only for each complete revolution of the crank-disk 6, *i. e.* when the platen reaches its dotted line position during the left-hand stroke of rod 9, the cam groove 40 being so proportioned and timed as to effect that object.

What is claimed is:

1. In a mechanism of the character specified, the combination of a driving element; a reciprocatory driven element; and a link

connection between said driving and driven elements, for operating the latter from the former, embodying a clutch which consists of a pair of oppositely-acting gags normally engaged with said driven element, and means for automatically and periodically separating said gags to release said clutch from such engagement during the movement of the link connection.

2. In a mechanism of the character specified, the combination of a driving element; a reciprocatory driven element; and a link connection between said driving and driven elements, for operating the latter from the former, embodying a clutch which includes a gag normally engaged with said driven element, and means for automatically releasing said clutch from such engagement during a portion of each movement of the link connection in one direction.

3. In a mechanism of the character specified, the combination of a driving element; a reciprocatory driven element; and a link connection between said driving and driven elements, for operating the latter from the former, embodying a clutch which consists of a pair of rocking levers provided with gags normally engaged with said driven element, and means for automatically and periodically rocking said levers to release their gags from such engagement during the movement of the link connection.

4. In a mechanism of the character specified, the combination of a driving element; a reciprocatory driven element; and a link connection between said driving and driven elements for operating the latter from the former, embodying a clutch which comprises a pair of oppositely-acting gags normally engaged with said driven element, and a sliding member operatively connected with said gags for automatically and periodically separating the same from such engagement during the movement of the link connection to release the clutch.

5. In a mechanism of the character specified, the combination of a driving element; a reciprocatory driven element; and a link connection between said driving and driven elements for operating the latter from the former, embodying a clutch which comprises a pair of oppositely-acting gags normally engaged with said driven element, and cam-operated means for automatically and periodically separating said gags to release the same from such engagement during the movement of the link connection.

6. In a mechanism of the character specified, the combination of a driving element; a reciprocatory driven element; and a link connection between said driving and driven elements, for operating the latter from the former, embodying a pair of gag provided members normally engaged with said driven element, a movable member operatively connected with the first-named members, and a cam connected with the second-named members for automatically and periodically actuating the same to release said second-named members from such engagement during the movement of the link connection.

7. In a mechanism of the character specified, the combination of a driving element; a reciprocatory driven element; and a link connection between said driving and driven elements, for operating the latter from the former, embodying a pair of gag-provided members normally engaged with said driven element, a movable cam operatively connected with said members, and means connected with said cam for automatically and periodically actuating the same to release said members from such engagement during the movement of the link connection.

8. In a mechanism of the character specified, the combination of a driving element; a reciprocatory driven element; and a link connection between said driving and driven elements, for operating the latter from the former, embodying a clutch normally engaged with said driven element, a sliding cam operatively connected with said clutch, and a cam-connected with the first-named cam for automatically and periodically shifting the same bodily in one direction to release said clutch from engagement during the movement of the link connection.

9. In a mechanism of the character specified, the combination of a driving element; a reciprocatory driven element; and a pivoted link connection between said driving and driven elements, for operating the latter from the former, embodying means normally engaged with the driven element; and means for automatically releasing the first-named means from such engagement during a portion of each movement of the link connection in one direction.

10. In a mechanism of the character specified, the combination of a rotary driving element having a crank pin provided with a closed cam groove formed therein; a reciprocatory driven element; and a link connection between said driven element and said crank pin, for operating the former from the driving element, embodying means normally engaged with said driven element, releasing means therefor, and a member for automatically and periodically actuating said releasing means having a pin engaged in said cam groove.

11. In a mechanism of the character specified, the combination of a rotary driving element having a crank pin provided at its end with a cam; a reciprocatory driven element; and a link connection between said driven element and said crank pin, for operating the former from the driving element, embodying means normally engaged with said driven element, releasing means there-

for, and a member for automatically and periodically actuating said releasing means having connection with said cam for actuation thereby.

12. In a mechanism of the character specified, the combination of a driving element; a reciprocatory driven element provided with a stud having a bearing block loosely fitted thereon; and a link connection between said driving and driven elements provided at its end with a recess wherein said block is slidably received, and embodying means normally engaged with said block, and means for automatically and periodically releasing the first-named means from such engagement.

13. In a mechanism of the character specified, the combination of a driving element; a reciprocatory driven element provided with a stud having a bearing block loosely fitted thereon; and a link connection between said driving and driven elements provided at its end with a recess wherein said block is slidably received, and embodying a clutch normally engaged with said block, and means for automatically and periodically releasing said clutch.

14. In a mechanism of the character specified, the combination of a driving element; a reciprocatory driven element; and a link connection between said driving and driven elements for operating the latter from the former, embodying a pair of rocking members normally engaged with the driven element, and a movable member for automatically and periodically releasing the first-named members from such engagement during the movement of the link connection, the second named member having a pair of diverging slots wherein said first named members are operatively engaged.

15. In a mechanism of the character specified, the combination of a driving element; a reciprocatory driven element; and a link connection between said driving and driven elements for operating the latter from the former, embodying a pair of rocking members provided at their forward ends with jaws normally engaged with the driven element and at their rear ends with pins, and a movable member for automatically and periodically operating the first-named members during the movement of the link connection, to release said jaws from such engagement, the second named member having a pair of diverging slots wherein said pins are engaged.

16. In a mechanism of the character specified, the combination of a driving element; a reciprocatory driven element; and a link connection between said driving and driven elements for operating the latter from the former, embodying a pair of rocking members provided at their forward ends with jaws normally engaged with the driven element and at their rear ends with pins, and an endwise-slidable member for automatically and periodically operating the first named members during the movement of the link connection, to release said jaws from such engagement, the second-named member having a pair of diverging slots wherein said pins are engaged.

17. In a mechanism of the character specified, the combination of a driving element; a reciprocatory driven element; and a link connection between said driving and driven elements for operating the latter from the former, embodying a pair of rocking members provided at their forward ends with jaws normally engaged with the driven element and at their rear ends with pins, an endwise-slidable member for automatically and periodically operating the first named members during the movement of the link connection, to release said jaws from such engagement, the second-named member having a pair of diverging slots wherein said pins are engaged, and a cam connected with said second-named member for actuating the same.

18. In a mechanism of the character specified, the combination of a driving element; a reciprocatory driven element; and a link connection between said driving and driven elements for operating the latter from the former, embodying a pair of rocking members provided at their forward ends with jaws normally engaged with the driven element and at their rear ends with pins, a movable member for automatically and periodically operating the first-named members during the movement of the link connection, to release said jaws from such engagement, the second-named member having a pair of diverging slots wherein said pins are engaged, and a cam connected with said second-named member for actuating the same.

19. In a safety device for machines equipped with a multi-part movable yieldable work engaging bed and an opposing bed, driving means for the movable bed carrying a cam, means to interlock the movable bed when it reaches a pre-determined point in its working movement, and means operated by said cam to operate said interlocking means to permit said movable work engaging bed to yield when the bed encounters an obstruction in its path before it reaches in its travel said predetermined point.

20. In a safety device, a work engaging element, a carrier for movably supporting said element whereby it is permitted to have independent movement relative thereto, means to lock the carrier and element together when the path of the element to the work is free, and means to allow the carrier to move independently of said element, whereby when the element is engaged by an obstruction extraneous to the work the ele-

ment will be arrested and the carrier permitted to complete its movement independent of the element.

21. A safety device for presses or the like comprising a frame, a work engaging element yieldably mounted thereon, an opposing element, means for interlocking the work engaging element and frame to act upon work interposed between the work engaging element and the opposing element, and means to operate the interlocking means to permit the work engaging element to yield when subjected to pressure before it acts upon the work.

22. In a safety device comprising a duplex element, the parts of which are movable simultaneously with and independent of each other, an opposing element, said elements being normally adapted to exert a pressure on work interposed therebetween, said duplex element being constructed to automatically yield if subjected to pressure before it acts on the work.

23. In a mechanism of the character specified, the combination of a driving element, a reciprocating element and a bed, a link connection between said driving and driven elements, and cam actuated means to prevent the link from exerting a pressure upon the reciprocating element until the link reaches a predetermined point in its working stroke.

24. In a safety device comprising a link mechanism in combination with a reciprocating driven element and a driving element, means to actuate the link mechanism to exert a pressure upon the reciprocating element at a predetermined point in its working stroke and cam actuated means to prevent the link mechanism from exerting a pressure upon the reciprocating element prior to said element reaching a predetermined point in its working stroke when said element is subjected to pressure.

25. In a mechanism of the character specified, the combination of an oscillating element and a bed, a link mechanism to connect said bed and oscillating element comprising means to force the oscillating element to exert a pressure upon the bed, and cam actuated means to prevent the oscillating element from exerting a pressure upon the bed when an obstruction is encountered.

26. In a mechanism of the character specified, the combination of a driving element, a reciprocatory driven element, and a link connection between said driving and driven elements, for operating the latter from the former, embodying cam actuated gags normally engaged with the driven element, and means for automatically and periodically releasing said cam actuated gags from such engagement during the movement of the link connection.

27. In a mechanism of the character specified, the combination of a movable element and a bed, a link mechanism to connect said bed and movable element comprising cam actuated means to force the movable element to exert a pressure upon the bed, and cam actuated means to prevent the movable element from exerting a pressure upon the bed when an obstruction is encountered.

28. In a machine of the type set forth, driving means, a reciprocating work engaging element, and a link connection between said means and element including a gag movable to make or break the connection, and means to operate the gag so as to make the connection when the path of the element to the work is free.

29. In combination with a work engaging element, and a driver having a crank pin, yieldable means connected to the element and driver for actuating the former from the latter, means to hold said yieldable means rigid and against yielding, and a cam on the crank pin for actuating said holding means so as to maintain the yieldable means rigid when the path of the element to the work is free.

30. In combination with a duplex work engaging element and a driver having a crank pin, means to lock the parts of said element for simultaneous movement, and a cam on the crank pin for actuating said locking means whereby to cause said parts to have simultaneous movement when the path of the element to the work is free and to allow said parts to have independent movement when the path of the element is obstructed by an object extraneous to the work.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES F. ROOT.

Witnesses:
M. J. CANADAY,
W. B. VAN AUKEN.