C. F. ROOT.

SAFETY DEVICE FOR PUNCHING MACHINES.

APPLICATION FILED JAN. 2, 1914.

1,131,161.

Patented Mar. 9, 1915.

2 SHEETS—SHEET 1.

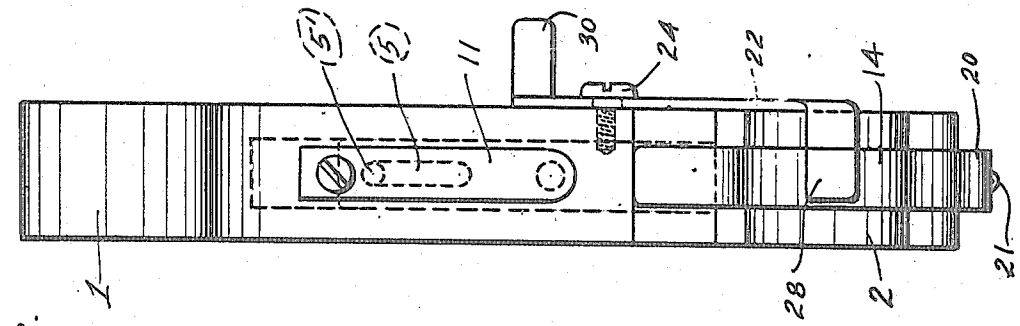


Fig. 3.

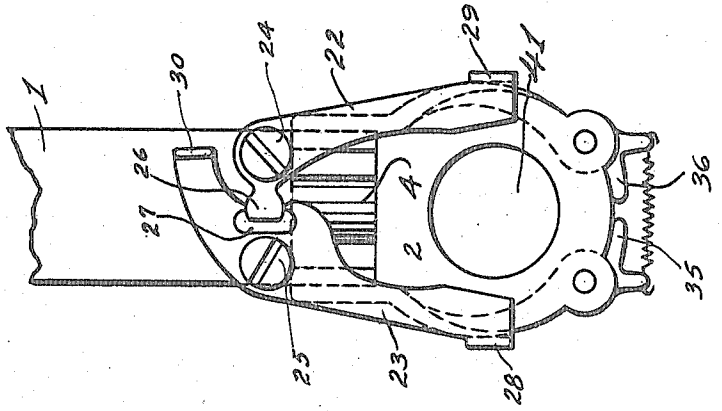


Fig. 2.

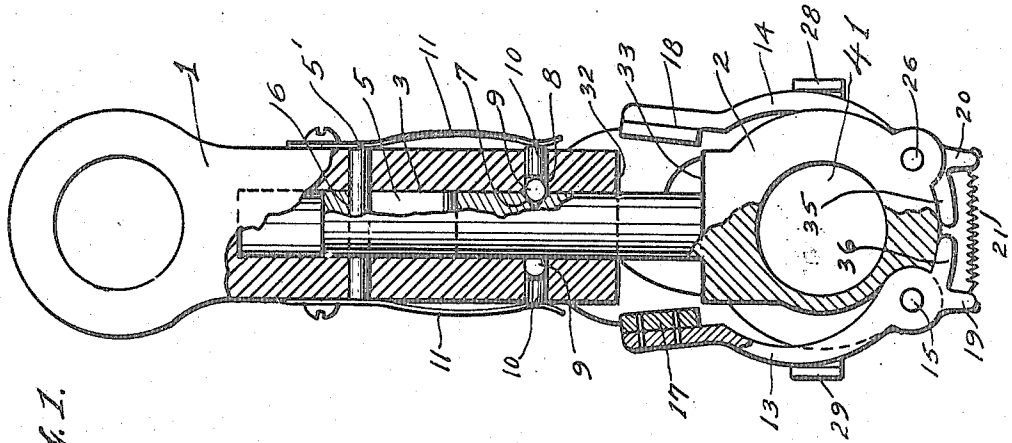


Fig. 1.

Witnesses

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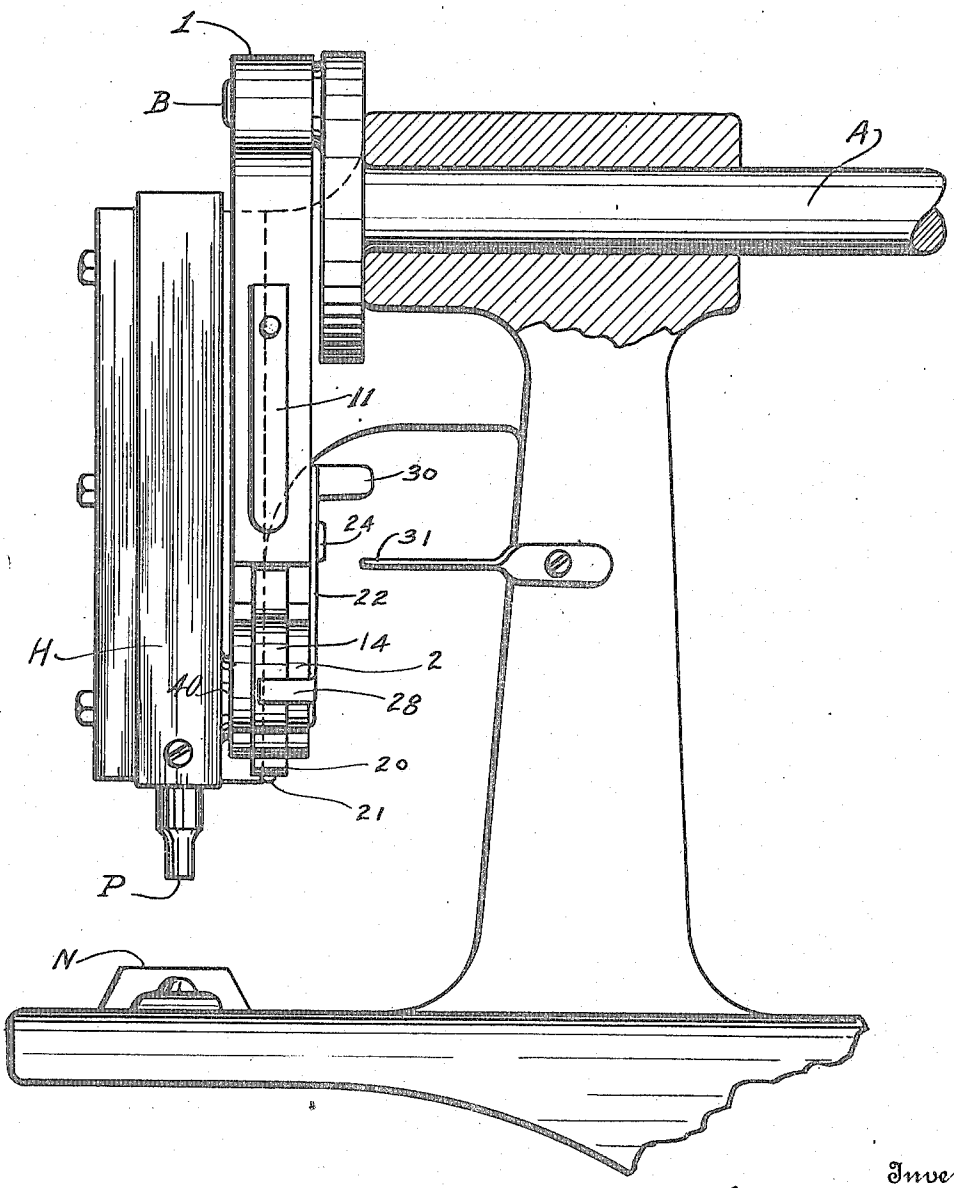
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2 SHEETS—SHEET 2.

Fig. 4.



Witnesses

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UNITED STATES PATENT OFFICE.

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SAFETY DEVICE FOR PUNCHING-MACHINES.

1,131,161. Specification of Letters Patent. Patented Mar. 9, 1915.

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To all whom it may concern:

Be it known that I, CHARLES F. ROOT, 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 Safety Devices for Punching-Machines or the like, of which the following is a specification.

This invention relates to certain new and useful improvements in safety devices for punching machines and the like, and relates more particularly to machines of varying types, such as printing presses, punching presses, staying machines, or any other type of machine, which embodies a reciprocating work-performing element, such as a plunger.

The primary object of the invention is to provide a machine of the type set forth with means which automatically causes the work-performing element to remain inoperative, if in its descent any obstruction, such as the hand of the operator, or one of the fingers of the hand, is met with.

Further, the invention aims to provide means which is incorporated in the reciprocating element so as to only render the latter operative, or rigid, just prior to or at the instant of commencement of the punching, pressing, forming or stamping operation, or in other words only at the instant that the reciprocating element is about to enter into actual or physical contact with the work.

Still further, the invention aims to provide means which is sensitive to operation by the finger or hand of the operator, should the finger or hand be in a position subject to injury by the reciprocal element, without actual injury to the finger or hand.

Further, the invention aims to provide a structure which can be adjusted to operate in connection with material possessed of varying thicknesses.

In the drawings: Figure 1 is a front elevation, partly broken away and in section, showing the essence of the invention illustrated as a preferred embodiment in connection with a telescopic link; Fig. 2 is a fragmentary rear elevation; Fig. 3 is a side elevation of Fig. 1; and Fig. 4 is a side elevation, partly broken away and in section, of a plunger type of machine having the present invention embodied therein.

The preferred embodiment of the invention, includes a two-part link, one part 1 telescopically receiving the shank 4 of the other part 2 in a passage 3 provided for said shank. The shank 4 has a longitudinal slot 5 in its upper portion, through which a transverse pin 5′ passes, the pin 5′ by engagement with the end wall 6 that the slot 5 forms, limiting the downward movement of the part 2. The upward movement of the shank 4 is restricted by the length of the slot 5.

The shaft A of the machine which is conventionally illustrated in the drawings has an eccentric B, which connected to the head of the part 1 effects reciprocatory movement of the link and in order to prevent the up and down movement of the link from throwing or moving the part 2 upwardly relative to the part 1, depressions or seats 7 are provided at diametrically opposite points on the shank 4, which seats receive therein balls 9, the latter projecting and having movement in transverse apertures 8 provided in part 2. Plungers 10 also are disposed in the apertures 8 and slide therein, being normally tensioned by springs 11 which are carried by part 1 and which exert sufficient pressure on the balls 9 to hold same in their seats.

A pair of opposed curved arms 13 and 14 are pivoted, by means of pins 15 and 26 respectively, to the part 2 in such manner that blocks 17 and 18 connected to the upper ends of the arms 13 and 14 respectively, will normally move outwardly and occupy the inoperative or open position shown in Fig. 1. Lugs 19 and 20 respectively, depend from arms 13 and 14 and are connected by means of a coil spring 21 the latter acting to pull upon arms 13 and 14 so as to maintain same in the outward position shown in Fig. 1, stops 35 and 36 respectively, being borne by arms 13 and 14 to engage the head of part 2 so as to limit the outward movement of said arms.

A pair of arms 22 and 23 are pivoted upon part 1 by screws or the like 24 and 25, re-

spectively and have interengaging male and female parts 26 and 27, in order to effect simultaneous movement of said arms 22 and 23, the latter having lateral stop members 28 and 29, respectively which engage with intermediate portions of the arms 13 and 14 as depicted in the drawings. The arm 23 is provided with an extension 30 which is adapted to contact with the spring or yielding arm 31 secured to the machine. A head H carrying the punch or other tool P, is fastened to the part 2 of the link in any suitable manner, as by means of a pintle 40 on the rear face of the head H which engages eye 41 in the lower end of part 2 of the link.

In operation, arm 31, is arranged to project in the path of travel of the extension 30 just prior to the instant that the punch P engages with the work that is placed on the anvil N, which time of contact may obviously be varied by adjustment of arm 31. The extension 30 upon contacting with the arm 31 will be rocked upwardly thereby causing the stops 28 and 29 of arms 22 and 23 to move inwardly toward each other, thus causing said stops to actuate the arms 13 and 14 so as to move the blocks 17 and 18 borne by the arms 13 and 14, inwardly toward each other so as to interpose blocks 17 and 18 between the end 32 of part 1 and the end 33 of the part 2 with the result that the downward movement of the part 1 will be communicated to the part 2 and thereby to head H and punch P through the intermediary of the interposed blocks 17 and 18. Should, however, any obstruction appear between the anvil and punch, such as the finger or hand of the operator, the punch will contact with such obstruction before the extension 30 can reach or touch arm 31, consequently, the slight tension which the springs 11 exert on the balls 9 will be overcome, and the part 1 will continue its downward movement independently of the part 2 since the arms 13 and 14 have not been moved, due to the fact that the extension 30 not having engaged arm 31 the arms 13 and 14 remain in the position shown in Fig. 1 in which position the blocks 17 and 18 are not interposed between parts 1 and 2, which interposition of said blocks is necessary if part 2 is to partake of the working stroke of the part 1.

What is claimed is:

1. The combination with a work-performing element and its actuating means, of normally collapsible connections therebetween, means whereby said connections are rendered rigid and against collapsing, and means to automatically operate said second named means during the operative movement of the work-performing element and just prior to the engagement of said element with the work and when the path of the element is free to render said connections rigid and against collapsing.

2. The combination with a moving part of a machine and its actuating means, of normally yieldable connections therebetween, adapted to yield when the movement of said part is resisted, means whereby said connections are rendered rigid and against collapsing, and means to automatically operate said second named means at a predetermined point in the movement of said part to render said connections rigid and nonyielding when the path of the element is free and just prior to the engagement of said element with the work.

3. The combination with a moving element of a machine and its actuating means, of normally yieldable connections comprising relatively movable parts, means to positively connect said parts, and means to actuate said connecting means at a predetermined point in the operative movement of said element, said parts being adapted to yield and move relatively to each other when the movement of said element is resisted by an extraneous obstruction before said predetermined point is reached.

4. In combination with a reciprocating member, and its driver, a telescopic actuating device in connection with said member and driver, means to prevent telescoping of said device and to allow telescoping of the device upon the member engaging an obstruction extraneous to the work on the operative movement of said member, and means to actuate said first named means after said device has moved a predetermined distance.

5. In combination with a reciprocating member, a multi-part actuating device in connection with said member the parts of which device are normally movable relative to each other, and means to automatically effect rigid connection between and simultaneous movement of said parts on the operative stroke of said member and just prior to the member contacting with the work and when the path of the member is free.

6. In combination with a reciprocating member to act upon the work, collapsible means in connection with said member, and automatic means operable on the operative stroke of said member and slightly in advance of the engagement of said member with the work and when the path of the member is free to hold said collapsible means rigid.

7. In combination with a reciprocating member to act upon the work, a pair of telescopic parts one of which is in connection with said member, means for interposition between normally spaced adjacent portions of said parts to effect downward movement

of same in unison, and automatic means to actuate said first named means on the operative stroke of said member and just prior to said member engaging with the work and when the path of the member is free.

8. The combination with a reciprocating member to act on the work, and means to actuate said member, of automatic means associated with said member and its actuating means whereby said member is allowed to idle during its operative stroke when said member contacts with an obstruction extraneous to the work.

9. In combination with a reciprocating member to act on the work, and means to actuate said member, a collapsible link connected to said member and actuating means, means to hold the link rigid just prior to the member contacting with the work, and means to automatically actuate said holding means when the path of the member is free.

10. In combination with a reciprocating member to act on the work, and means to actuate said member, movably connected devices one of which is connected to the member and the other of which is connected to said means, means to cause said devices to move in unison and means to actuate the last named means on the operative stroke of said member when the path of the member is free and just prior to said member engaging the work.

11. A safety attachment for presses and the like, comprising a link formed of sections capable of longitudinal movement relative to each other, said sections adapted to move in unison under normal conditions of operation, but to yield upon encountering resistance by an obstruction extraneous to the work, means connected to one of the link sections adapted to be interposed between the sections to rigidly connect the same, but normally out of such connecting relation, mechanism for moving said connecting means into engaging relation, and a member to actuate said mechanism.

12. In combination with reciprocating means to act upon work, means normally inoperative and capable of being maintained inoperative by engagement of an obstruction with said reciprocating means during the working stroke of said reciprocating means to actuate the latter, and means for rendering said actuating means operative when the path of the reciprocating means is free.

13. In a machine having driving means and a reciprocable element actuated by the driving means, normally inoperative means connecting the driving means and element and capable of being maintained inoperative upon said element contacting with a projection extraneous to the work, and means for rendering said connecting means operative on the working stroke of said element and when the path of the element is free.

14. In combination with reciprocating means to act upon the work, and normally inoperative means to actuate said means, means operable on the working stroke of said element and to automatically render said second-named means operative when the path of the reciprocating means is free, said last named means being ineffective upon the reciprocating means contacting with an obstruction extraneous to the work.

15. In combination with the eccentric drive of a machine, and the work-performing element thereof, a link which is connected to the element and to said drive, and means whereby the link effects operative stroke of the element when the path of the element is free and whereby said link is automatically prevented from operation upon said element contacting with an object extraneous to the work.

16. In combination with a reciprocating element and its actuating means, a safety device connected to said element and means for actuating the element from the actuating means said device including a plurality of parts which are normally movable so as to give when the element engages an extraneous obstruction, and means to lock the parts against movement when the path of the element is free.

17. The combination with the reciprocating working member of a machine, of a safety device, comprising normally freely telescoping members, and members adapted to render said telescoping members rigid at adjustable distances from the work.

18. The combination with a work-performing element and its actuating means, of normally yieldable connections therebetween, and means automatically operable after the beginning of the operative movement of said element and just prior to the engagement of said element with the work to render said connections rigid.

19. The combination with a work-performing element and its actuating means, of means controlled by the work-performing element to render the actuating means ineffective upon resistance being offered to the operative movement of said element prior to its engagement with the work.

20. The combination with a reciprocating work-performing element and an actuator, of connections therebetween operative to transmit power from the actuator to the work-performing element, and means controlled by the work-performing element to render said connections ineffective upon resistance being offered to the operative movement of the work-performing element prior to its engagement with the work.

21. In a machine of the class described,

the combination with two opposing elements coöperative to exert pressure upon interposed work and one of which elements is movable toward and from the other, and actuating means for said movable element, of means controlled by said movable element to render its actuating means ineffective upon resistance being offered to the operative movement of said movable element prior to its engagement with the work.

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

CHARLES F. ROOT.

Witnesses:
JOHN H. COSS,
LELA RITCHIE.