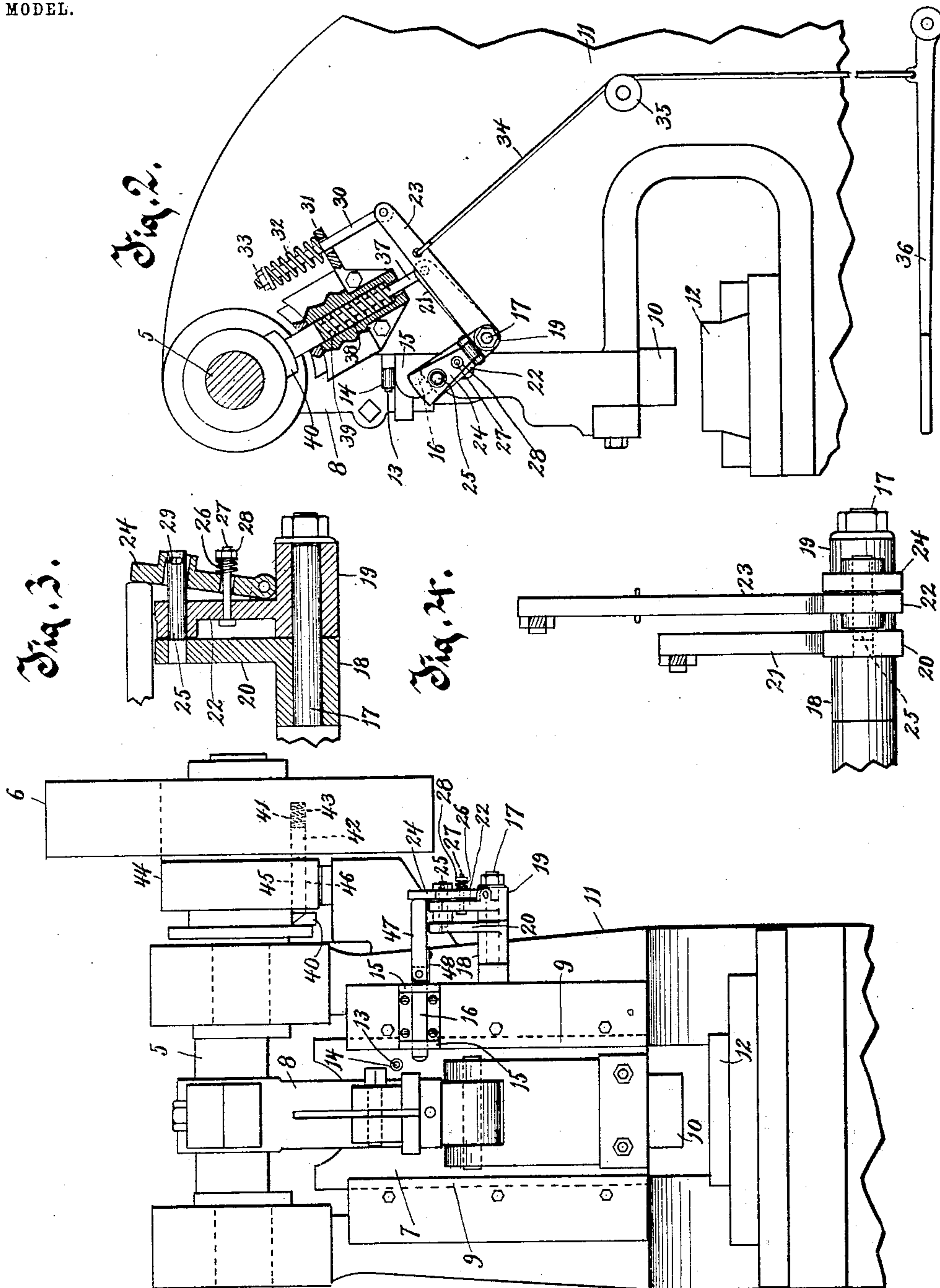


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J. MIOTKE.
SAFETY DEVICE FOR PUNCH PRESSES.
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NO MODEL.



Witnesses.

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Fig. 1.

UNITED STATES PATENT OFFICE.

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SAFETY DEVICE FOR PUNCH-PRESSES.

SPECIFICATION forming part of Letters Patent No. 733,412, dated July 14, 1903.

Application filed April 22, 1903. Serial No. 153,772. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH MIOTKE, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Improvement in Safety Devices for Punch-Presses, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention relates to improvements in safety devices for punch-presses.

In the ordinary working of a punch-press the operator by pressing on a lever operates clutch mechanism, so as to clutch the driving or belt wheel to the shaft which reciprocates the plunger to thereby cause the down movement and return up movement of the plunger. In operating a punch-press for many kinds of work the operator simply depresses the foot-treadle and then removes his foot, and after the plunger has completed its up movement it will be held in such position, and thereby give the operator ample opportunity to feed the material to be punched to the die. The treadle is then again depressed for another reciprocation, the punch acting on the material on the down movement to effect the desired punching of said material, and the operator's foot being again removed, so as to afford him another opportunity to remove the punched material and again feed a new piece of material to be punched, and so on throughout the operation. Quite frequently the operator neglects to remove his foot from the treadle, with the result that the die descends while he is in the act of feeding the material, and consequently his hand is caught between the punch and die and severely injured. Again, in some classes of work the operator depresses the treadle and retains pressure thereon, with the result that the plunger is caused to make a succession of reciprocations and the operator is compelled to remove the punched material and feed new material during the intervals of time the plunger is ascending and before its return downstroke. Frequently, however, through carelessness or otherwise the operator fails to remove his hand before the plunger has completed its down movement, with

the result, of course, of serious injury to the hand of the operator.

The primary object of the present invention is to make it impossible for injuries of the above character to take place; and with this object in view the invention consists of the devices and parts or their equivalents, as hereinafter more fully set forth.

In the accompanying drawings, Figure 1 is a front elevation of a punch-press equipped with my improvements, the lower portion of the press being broken away. Fig. 2 is an end elevation of Fig. 1 with the shaft in section and other parts broken away. Fig. 3 is a central section, on an enlarged scale, through the upright arms of the bell-crank levers and the latch; and Fig. 4 is a plan view of the parts illustrated in Fig. 3.

Referring to the drawings, the numeral 5 indicates the main shaft for causing the reciprocation of the plunger. On one end of this shaft is loosely mounted a drive-belt wheel 6, suitable clutch mechanism, which will hereinafter be described, being employed to connect this drive-belt wheel to the shaft.

The numeral 7 indicates the plunger or die-head, which is connected to the shaft 5 by means of a link 8 in such manner that when said shaft is rotated an up-and-down movement is imparted to the plunger or head. The plunger or head carries at its lower end the punch 10. The guideways 9 are connected to or formed on a frame 11, and this frame carries the usual die 12, which is in line with the punch. The plunger or head has projecting forwardly therefrom a pin 13, and the end of this pin has preferably mounted thereon an antifriction-roller 14. The frame 11 has outstanding therefrom lugs 15 15, said lugs provided with registering openings which form bearings for a finger 16, said finger being movable laterally in the openings. The inner end of the finger 16 is in line to be contacted by the antifriction-roller 14 on the end of the pin 13.

Outstanding from the frame is a shaft 17. Mounted rotatably on this shaft are sleeves 18 and 19. Sleeve 18 has projecting therefrom at angles to each other arms 20 and 21, said arms forming a bell-crank lever. Sleeve

19 has also projecting therefrom at angles to each other arms 22 and 23, which also form a bell-crank lever. The arms 20 and 22 of the respective bell-crank levers are normally parallel to each other and are provided near their upper ends with openings which when said arms are in normal position are in registration. The arms 21 and 23 of the respective bell-crank levers are normally parallel or substantially parallel to each other, and the arm 23 is extended, so as to be of greater length than the arm 21. Pivoted at its lower end to the lower portion of the arm 23 of the outer bell-crank lever is a latch 24. This latch carries an inwardly-extending pin 25, which pin when the arms 20 and 22 of the respective bell-crank levers are parallel is adapted to extend through the registering openings of said arms. The upper end of the latch 24 is in line to be contacted with by the outer end of the finger 16. The latch 24 is maintained in such position as to cause the pin 25 to engage the registering openings of the arms 20 and 22 of the bell-crank levers by means of a coiled spring 26, which surrounds a pin 27, passing through the arm 22 of the outer bell-crank lever and through the latch 24, the said spring being confined between a nut or enlargement 28 on the pin 27 and the outer side of the latch. It will be seen that the inwardly-extending pin 25 of the latch 24 is pivotally carried by said latch, a pin projecting from the wall of the opening of the latch passing into a transversely-elongated slot 29 in said pin. To the outer end of the long arm 23 of the outer bell-crank lever is pivotally connected a rod 30, said rod projecting through an opening in a fixed projection 31. A coiled spring 32 encircles the rod 30 and is confined between the fixed projection 31 and a nut 33, turned onto the upper end of said rod. Connected to the arm 23 of the outer bell-crank lever intermediate of the ends of said arm is a rope or cable 34. This rope or cable extends downwardly over a guide-pulley 35 and is connected at its lower end to a foot-treadle 36.

Pivotally connected to the outer end of the arm 21 of the inner bell-crank lever is a rod 37. This rod extends upwardly through the bore of a tube 38 and is encircled within said tube by a coiled spring 39. The upper end of the rod 37 extends out of the tube and carries a clutch-head 40. The normal position of this clutch-head is that illustrated in Fig. 2, and in such position the drive-belt wheel 6 is maintained loose on the main shaft 5. This may be accomplished in various ways. In Fig. 1 of the drawings is shown devices in connection with the clutch-head for holding the drive-belt wheel out of clutch with the main shaft when the clutch-head 40 is in the position illustrated in Fig. 2. Referring to this mechanism, the numeral 41 indicates a recess in the drive-belt pulley. In this recess is a short pin 42, and also within the recess and disposed between the inner end of

the short pin and the rear wall of the recess is a coiled spring 43, which normally acts to force the short pin outwardly. Rigid on the shaft 5 is an enlargement or collar 44, provided with a transverse opening 45. In this opening is disposed a pin 46. The inner end of this pin is beveled, as clearly illustrated in Fig. 1, and this beveled end is adapted to register and match with the beveled surface on the outer side of the clutch-head 40. When the clutch-head is in the position illustrated in Fig. 2, its beveled surface acts against the beveled end of the pin 46 and forces and holds said pin outwardly, and the pin 46 in turn at its outer end bears against the inner end of the short pin 42 and presses said pin sufficiently into the recess 41 against the action of the coiled spring 43 as to prevent said short pin from extending into the opening 45. It is obvious, therefore, that with the rotation of the drive-belt wheel the main shaft 5 is maintained out of clutch therewith. When, however, the clutch-head 40 is drawn from the position illustrated in Fig. 2, its beveled surface is withdrawn from the beveled end of the pin 46, and the coiled spring 43 will then force the short pin 42 inwardly for a short distance into the opening 45 as soon as said short pin in the rotation of the drive-belt wheel is brought into alinement with the transverse opening 45.

In the operation of my invention the operator first depresses the foot-treadle. This causes a downward pull on the rope or cable 34, and as the upper end of said rope or cable is attached to the long arm 23 of the outer bell-crank lever and inasmuch as the other arm 22 of said bell-crank lever is connected to the corresponding arm 20 of the inner bell-crank lever the two bell-crank levers will be turned together for a limited distance. The two bell-crank levers being thus turned together, the arm 21 of the inner bell-crank lever exerts a downward pull of the rod 37, and hence draws the clutch-head 40 out of engagement with the pin 46, and thereby provides for the rotation of the drive-belt wheel being imparted to the main drive-shaft in the manner hereinbefore described. As the main drive-shaft revolves the plunger is caused to descend. After the plunger has descended a short distance the antifriction-roller on the end of the pin 13 engages with the inner end of the finger 16 and moves said finger outwardly. On this movement outwardly of the finger its outer end acts against the upper end of the latch 24 and swings said latch on its pivot to such an extent as to withdraw the inwardly-extending pin 25 of the latch from engagement with the arm 20 of the inner bell-crank lever. The moment the arm 20 of the inner bell-crank lever is thus released from the arm 22 of the outer bell-crank lever the said inner bell-crank lever by the re-coil of the coiled spring 39 will force the rod 37 upwardly to its initial position, (shown in Fig. 2,) and inasmuch as the lower end of rod 37 is con-

nected to the arm 21 of the inner bell-crank lever the said inner bell-crank lever by this movement of rod 37 is turned back to its normal position. The plunger of course continues its down movement, and the moment the antifriction-roller 14 escapes the end of the finger 16 the expansion of the spring 26 acts on the latch 24 and tends to thrust said latch inwardly; but as the inner end of pin 25 is now against the solid outer face of the arm 20 of the inner bell-crank lever of course the latch for the time being is retained in its outwardly-thrust position. The plunger after completing its full downstroke to effect the punching operation then ascends. When the clutch-head 40 returns to its initial position (shown in Fig. 1) in the manner above described, it is in position to engage the pin 46 when the shaft has made one revolution, and when it does so engage pin 46 it will move said pin outwardly and cause it to act against pin 42 and thrust said pin 42 out of engagement with the recess 45, and thereby unclutch shaft 5 from wheel 6 and prevent a further down movement of the plunger, and hence give the operator ample opportunity to remove the work and feed in new material. Of course the operations above described take place on the operator depressing the foot-treadle and then removing pressure thereon, and the outer bell-crank lever of course only returns to its normal position when the operator's foot is removed from the treadle. It follows that before a further reciprocation of the plunger can be effected, therefore, the operator must remove his foot from the treadle, so as to permit the pin 25 to again engage the opening of the arm 20 of the inner bell-crank lever, and thereby lock said lever to the arm 22 of the outer bell-crank lever. After this is effected the operator must again depress the foot-treadle and remove pressure thereon for a repetition of the operations explained.

It will be seen from the above description that the construction is such that it is impossible for the plunger-head to descend and crush the hand of the operator during the time said operator is feeding to the press or removing work therefrom, inasmuch as under all conditions the plunger-head will only make a down movement and then an up movement and will then stop, so as to afford ample opportunity for the operator to withdraw his hand, and no further reciprocation of the plunger will occur until the operator again depresses the foot-treadle.

I prefer to make the construction of such character that the safety mechanism can be thrown entirely out of operation when desired, so that the press will work as an ordinary punch-press without the safety mechanism coming into play. To accomplish this, I make the finger 16 of two sections—viz., the main section 16 and an outer section 47, which is pivoted at its inner end to the outer end of section 16. When section 47 is turned

downwardly to the position shown in Fig. 1, the safety mechanism is then in operative position. If it is desired to throw said safety mechanism out of operation, all that is necessary to be done is to turn the section 47 upwardly. A flat spring 48 bears against the under edge of section 47 and serves to maintain it in its upwardly-adjusted position.

What I claim as my invention is—

1. In a safety device for punch-presses, the combination of a frame, a shaft mounted therein, a drive-pulley on the shaft, clutch mechanism for clutching and unclutching the shaft to the pulley so as to cause the rotation of the pulley to be imparted to the shaft, or to cause said pulley to run loose on the shaft, a punch-carrying plunger connected to the shaft so as to be reciprocated thereby, clutch-operating mechanism operated by the movement of the punch-carrying plunger, a treadle or lever, and a rope connected at one end to the treadle or lever, and at its other end to the clutch-operating mechanism, said treadle or lever when depressed causing the clutch mechanism to clutch the pulley to the shaft and thereby effect a down movement and a return up movement of the plunger, said down movement of the plunger acting on the clutch-operating mechanism so as to cause said mechanism to release the clutch mechanism and thereby hold the plunger upwardly on the completion of its upstroke and prevent further reciprocation of the plunger until the operator removes pressure on the treadle or lever and again depresses the same, and means for causing the clutch mechanism to return to normal position when the operator removes pressure on the treadle or lever.

2. In a safety device for punch-presses, the combination of a frame, a shaft mounted therein, a drive-pulley on the shaft, clutch mechanism for clutching and unclutching the shaft to the pulley so as to cause the rotation of the pulley to be imparted to the shaft, or to cause said pulley to run loose on the shaft, a punch-carrying plunger connected to the shaft so as to be reciprocated thereby, clutch-operating mechanism operated by the movement of the plunger, a treadle or lever, a rope connected at one end to the treadle or lever and at its other end to the clutch-operating mechanism, said treadle or lever when depressed causing the clutch mechanism to clutch the pulley to the shaft, and thereby effect a down movement and a return up movement of the plunger, said down movement of the plunger acting on the clutch-operating mechanism so as to cause said mechanism to release the clutch mechanism and thereby hold the plunger upwardly on the completion of its upstroke and prevent further reciprocation of the plunger until the operator removes pressure on the treadle or lever and again depresses the same, means for returning the clutch-operating mechanism to normal position, when the operator removes

pressure on the treadle or lever, and means for throwing the clutch-operating mechanism into and out of operative position.

3. In a safety attachment for punch-presses, the combination of a frame, a shaft mounted therein, a drive-pulley on the shaft, clutch mechanism for clutching and unclutching the shaft to the pulley so as to cause the rotation of the pulley to be imparted to the shaft, or to cause said pulley to run loose on the shaft, a punch-carrying plunger connected to the shaft so as to be reciprocated thereby, a movable finger operated by the movement of the plunger, clutch mechanism operated by the movement of the finger, a treadle or lever, a rope connected at one end to the treadle or lever and at its other end to the clutch-operating mechanism, the said treadle or lever when depressed causing the clutch mechanism to clutch the pulley to the shaft and thereby effect a down movement and a return up movement of the plunger, said down movement of the plunger acting on the finger to cause said finger to operate the clutch-operating mechanism in such manner as to release the clutch mechanism and thereby hold the plunger upwardly on the completion of its upstroke and prevent further reciprocation of the plunger until the operator removes pressure on the treadle or lever.

4. In a safety device for punch-presses, the combination of a frame, a shaft mounted therein, a drive-pulley on the shaft, clutch mechanism for clutching and unclutching the shaft to the pulley so as to cause the rotation of the pulley to be imparted to the shaft, or to cause said pulley to run loose on the shaft, a punch-carrying plunger connected to the shaft so as to be reciprocated thereby, a movable finger operated by the movement of the plunger, said finger consisting of two sections pivoted together and normally in line, clutch-operating mechanism operated by the movement of the finger, when the two sections of the finger are in alinement, but not operated thereby when one of the sections of the finger is turned on the pivot, a treadle or lever, a rope connected at one end to the treadle or lever and at its other end to the clutch-operating mechanism, the said treadle or lever when depressed causing the clutch mechanism to clutch the pulley to the shaft and thereby effect a down movement and a return up movement of the plunger, said down movement of the plunger acting on the finger to cause said finger to operate the clutch mechanism in such manner as to release the clutch

mechanism and thereby hold the plunger upwardly on the completion of its upstroke and prevent further reciprocation of the plunger until the operator removes pressure on the treadle or lever and again depresses the same, and means for returning the clutch-operating mechanism to normal position, when the operator removes pressure on the treadle or lever.

5. In a safety device for punch-presses, the combination of a frame, a shaft mounted therein, a drive-pulley on the shaft, clutch mechanism for clutching and unclutching the shaft to the pulley so as to cause the rotation of the pulley to be imparted to the shaft, or to cause said pulley to run loose on the shaft, a punch-carrying plunger connected to the shaft so as to be reciprocated thereby, a movable finger operated by the movement of the plunger, a clutch-head provided with a projecting rod, said clutch-head when retracted clutching the pulley to the shaft, bell-crank levers, one arm of one of said levers having the rod of the clutch-head connected thereto, a rope or cable connected to the corresponding arm of the other bell-crank lever, a latch provided with a projecting pin which normally engages registering openings in the upstanding arms of the bell-crank levers and thereby locks said levers together, a treadle or lever to which one end of the rope or cable is connected, the said treadle or lever when depressed causing the locked bell-crank levers to be turned together and retract the clutch-head and thereby lock the pulley to the shaft and cause a down movement and a return up movement of the plunger, said down movement of the plunger acting on the finger, and causing said finger to operate the latch so as to remove the pin of the latch from engagement with the upright arm of that bell-crank lever which has the rod of the clutch-head connected to its other arm, whereby the clutch mechanism is released and the plunger is held up upon the completion of its upstroke, and prevented from further reciprocation until the operator removes pressure on the treadle or lever and again depresses the same, and means, when the operator removes pressure on the treadle or lever, for returning the parts to their normal position.

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

JOSEPH MIOTKE.

Witnesses:

C. T. BENEDICT,
A. L. MORSELL.