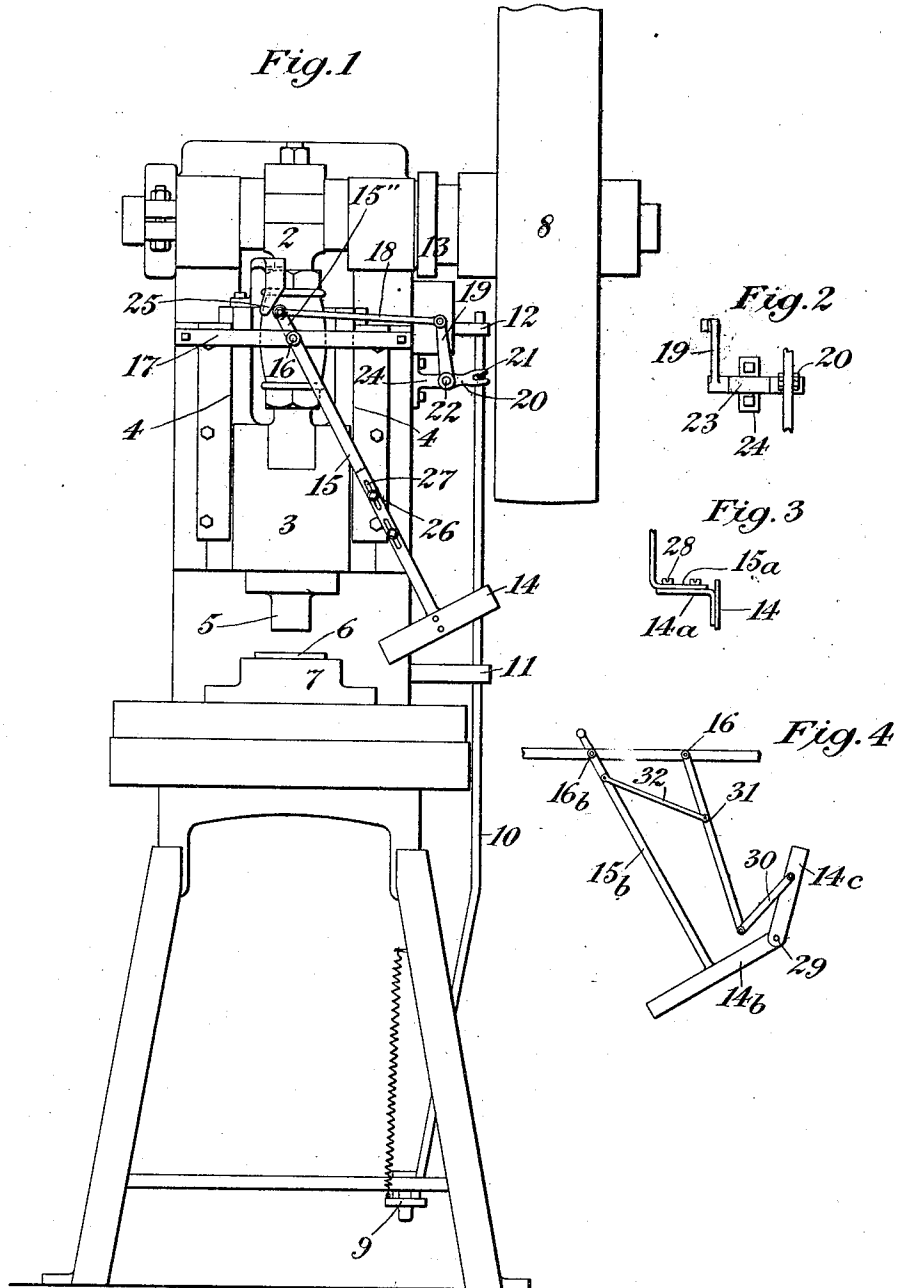


A. McK. KENDRICK.
SAFETY DEVICE FOR PRESSES, &c.
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UNITED STATES PATENT OFFICE.

ALEXANDER McK. KENDRICK, OF BROOKLYN, NEW YORK, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-HALF TO CHARLES J. PEMBROKE AND ONE-HALF TO FRANK KEIPER, BOTH OF ROCHESTER, NEW YORK.

SAFETY DEVICE FOR PRESSES, &c.

1,244,097.

Specification of Letters Patent.

Patented Oct. 23, 1917.

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To all whom it may concern:

Be it known that I, ALEXANDER McK. KENDRICK, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Safety Devices for Presses, &c., of which the following is a specification.

This invention relates to a safety device for presses, etc., and the main object of the invention is to provide an improved safety device or guard for preventing injury to an operator of a punch press, drop press, or other machine having a movable member for operating upon metal or other material in sheet form or otherwise to shape or form finished or partly finished articles from such material.

One of the principal objects of the present invention is to provide a safety device that will not in any manner interfere with the proper control of the machine and the placing of the work by the operator. In order to accomplish this result my improved safety device embodies a guard which is movable toward and away from the working point or throat of the machine, so as to leave this working point unobstructed for the placing and manipulation of the material to be acted upon by said machine. The preferred way in which I keep this working point unobstructed at the times when the operator should be permitted to place his hands under or adjacent to the vertically reciprocatory die of such press is by the use of a pendulous guard so constructed and mounted as to swing toward and away from the aforesaid working point; this guard being normally distant from the working point or throat of the machine, that is, out of the way when the machine is not passing through its cycle of movements, but swinging into position to strike the hand or wrist of the operator a blow of moderate force if his hand is in a position of danger after the machine has been tripped to go through its normal cycle of operations.

Another important feature of this safety device is that it not only protects the operator against accidents resulting from the proper tripping of the machine by the workman, but also against those accidents which are due to the improper repetition of a cycle of operations when the mechanism of the

machine is not operating properly. Here my improved safety device is so constructed as to be controlled both by the proper tripping of the machine by the operator for the starting of a cycle of operations and the improper tripping of the machine for a repetition of such cycle when the mechanism is out of order.

My improved safety device also has the important advantages of being simple in construction, easy to attach and detach without loss of time, and of being so constructed as to coöperate well with that portion of the machine which it is designed to guard, all of the parts being in this construction at the front of the machine and so located as to move the guard quickly and easily into position for striking the hand or wrist of the operator when the same is in a position of danger, that is, too close to the working point or throat of the press.

Other features of the invention not hereinbefore referred to will be hereinafter described and claimed and are illustrated in the accompanying drawings, in which,

Figure 1 illustrates one type of machine, to wit, an ordinary punch press, to which one form of a safety device embodying my invention is applied;

Fig. 2 is a detail illustrating in side elevation a connection between the trip rod and safety device of said machine;

Fig. 3 is a detail illustrating a modification of the safety device in which a forward and backward adjustment for the guard proper is provided, and

Fig. 4 is a detail of another modification illustrating a hinged guard for use on machines in which a rigid guard would interfere with the proper operation of other parts or would be interfered with by them.

Similar characters designate like parts in all the figures of the drawings.

While my invention may be applied to any type of machine in which it is desired to protect a workman from being injured between two parts having a relative movement toward and away from each other, it is particularly adapted for use in connection with the various kinds of foot and power presses having reciprocatory slides for carrying movable dies into and out of engagement with work located on fixed dies, as in punch presses, etc., and the embodi-

ment of the invention illustrated is in connection with an ordinary punch press having a drive-shaft near its upper end for operating through suitable connections, such as 2, a vertically reciprocatory slide, 3, movable up and down in the ways, 4, of said machine in the usual manner, and carrying a movable die or punch, 5, adapted to coact with a fixed die, 6, suitably supported at 7 on the bed of the machine. The drive-shaft carries the usual fly-wheel, 8, and this drive-shaft is intended to be brought into action in the usual manner by a starting device which when tripped or operated permits the making of a predetermined number of revolutions by said drive-shaft and fly-wheel, usually a single revolution to permit a single cycle of operations by the movable member or punch 5 and the parts by which it is operated. Here the starting device comprises, as usual, a treadle, 9, and a vertically reciprocatory trip-rod, 10, operated thereby and working, as usual, in a suitable guide, 11, and connected at its upper end to an arm, 12, controlling the operation of a suitable clutch mechanism, such as 13, this being usually a one-revolution clutch. As the construction and mode of operation of such clutches are well understood the clutch is not illustrated in detail.

The pendulous safety device or guard is here shown as comprising a guard-plate or guard proper, designated by 14, and a pendulum rod or lever, 15, pivoted at 16 near the upper portion of the machine to some suitable fixed point, which fixed point in this instance is in a cross-bar, 17, fastened to the two main uprights in which the guide-ways 4 for the slide 3 are formed. The rod 15 and the guard-plate 14 here constitute a substantially T-shaped member extending from a point near the upper end of the machine to a point far enough down to permit the guard plate to swing across the working point or throat of said machine at the forward side thereof. The rod 15 may be connected with the trip-rod 10 in any suitable manner for operation by the latter. Here a connecting rod, 18, joins the pendulum rod 15 to the upper end of the vertical arm, 19, of a bell-crank lever having a horizontal arm, 20, bifurcated at its free end to straddle a pin, 21, on the trip-rod 10 in the usual manner, the two arms 19 and 20 of this bell-crank lever being, as illustrated in Figs. 1 and 2, secured at some distance apart to a short shaft, 22, journaled in a bearing, 23, carried by a bracket, 24, attached to the main upright at the righthand side of the machine. The construction is such that each time the treadle 9 is operated and the trip-rod 10 pulled down the connections 18, 19 and 20 to the pendulous guard will be operated to swing the latter across the front of the press in position to strike the hand or

wrist of the operator if it is too near the danger point. This operation will of course take place in advance of the starting of the press by the clutch 13 which is also operated by said trip-rod. Means are also provided to secure the operation of the guard independently of the operation of the treadle. This is necessary in case the spring in the clutch breaks causing the ram to repeat its operation against the will of the operator who has raised the treadle. The pendulous guard is shown as having its pendulum rod 15 extended at 15" above the pivot 16 thereof to form a short lever arm to which the connecting rod 18 before described is joined, and the free end of this short arm 15" is so located as to be in the path of an element carried by the main slide 3 and is intended to be operated thereby on the descent of said slide if at such time the guard is in its normal position; that is to say, if, when the slide is descending, the guard has not been thrown into the safety position by the voluntary act of the operator, it will be so thrown into the safety position in the automatic operation of the mechanism by the action of a part connected preferably to the descending slide. The part illustrated herein for performing this operation of automatically throwing the guard into its safety position is a cam, 25, secured to some suitable point on the slide 3, it being illustrated here as fastened to the slide at the upper end thereof. The short arm 15" of the pendulum rod may have an antifriction roller, for coöperation with the face of the cam 25. On the proper descent of the slide, that is, a descent controlled by the voluntary starting of the machine by the operator, as by the depression of the treadle 9, the antifriction roller 15" will be out of the path of the cam 25 and will not be acted upon by it; but on an improper operation of said machine and its slide 3 the pendulous guard, then normally in the position shown in Fig. 1, will have the upper end of its pendulum rod in the path of the cam 25 and will be acted upon by said cam which will bring about the automatic throwing of the guard proper 14 into the safety position. Thus, whether the machine is going through a proper cycle of operations started by the operator, or is going through an improper cycle of operations due automatically to the improper action of the clutch mechanism, the operator will be guarded by the safety device shown. The guard may be returned to its inoperative position by any suitable means, the usual spring (not shown) that returns the treadle being utilized in the present case for that purpose, as will be obvious.

The pendulum rod 15 may of course be a single fixed element, but in order to adapt it for use on machines varying in size or height I prefer to make use of an adjustable pendulum rod made in two parts with

suitable provision, such as adjusting screws and slots, 26 and 27, for varying the length of the rod as desired.

The guard proper shown at 14 is fixedly secured to the lower end of the pendulum rod 15. In some cases, however, as for example where the fixed die is supported upon a bedplate of great width, it is desirable to provide for an adjustment of the plate 14 forward or backward to accommodate its position to base plates of different diameters. In Fig. 3 I have shown such a construction in which the pendulum rod is bent at its lower end into L-shape form to provide a forward extension, 15^a, and the guard-plate 14 has an L-shape member, 14^a, secured to the back thereof in such a manner as to be slidable forward and backward on the part 15^a of the pendulum rod. The means of adjustment may be similar in other respects to that shown in Fig. 1, that is, adjusting screws, such as 28, may cooperate with suitable slots in these parts to fasten the guard-plate in any desired position within the limits of the adjustment.

In Fig. 4 I have illustrated a further modification of the invention in which the main part of the guard and also the pendulum rod for the guard are similar in most respects to those shown in Fig. 1 and are operated in the same manner. These parts are designated by 14^b and 15^b and the pivot of the pendulum rod is indicated at 16^b. Instead, however, of the guard being a single, solid plate as in Fig. 1 it is shown as comprising two relatively movable members pivoted together as indicated at 29, the two parts of this guard-plate being designated by 14^b and 14^c. The relatively movable section 14^c of the guard proper is illustrated as connected by a link, 30, and a connecting rod, 31, to another fixed point, 16^b, some distance from the pivot point 16^b and the connecting rod 31 and the rod 15^b are joined by a link 32. The point of operation of the safety device remains the same in this modification, that it to say, it is operated by the connections before described to the upper end of the pendulum rod 15^b. The advantage of this modification is that in those types of presses in which the swing of a guard-plate made in one piece would bring the guard into the path of the fly-wheel or other part of the machine, such interference is avoided by the use of a sectional guard-plate one section of which is drawn up out of the path of such fly-wheel or other part each time that the guard is returned to its normal position. On the operation of said safety device, however, that is, the movement of the guard to its working position, the connecting means illustrated in Fig. 4 will cause the section 14^c to be swung into line with the section 14^b and the two parts will then move as

one piece when they are approaching the end of their working stroke to guard the operator from injury.

What I claim is:

1. The combination with a machine comprising a frame and an operating mechanism having a dangerous part, of a vertically disposed gate pivoted to the front portion of said frame at a point above said dangerous part and arranged to swing in a vertical plane from a position at one side of the operator's hands to its operative position in front of said dangerous part, a treadle for controlling the operation of said machine, means for operating said gate either from said dangerous part or by said treadle in advance of the operation of said dangerous part.

2. The combination with a power operated press having a press head and dies, of a safety device pivotally mounted on the press to move transversely across the front of the press dies, said device being normally positioned at a distance to one side of the vertical center of the front of the press dies and an actuating connection between said device and the press head for positively oscillating the device across said vertical center at the front of the dies at each stroke of the press, a treadle for said press and a connection between said treadle and said safety device whereby said safety device may be positively oscillated across the vertical center of the press dies in advance of the movement of the press head and held in such operated position during repeated movements of the press head.

3. The combination with a power operated press having a press head and dies, of a safety device pivotally mounted on the press to move transversely across the front of the press dies, said device being normally positioned at a distance to one side of the vertical center of the front of the press dies and an actuating connection between said device and the press head for causing a quick movement of the safety device across the front of the dies at the beginning of the downward movement of the press head, a treadle for said press and a connection between said treadle and said safety device whereby said safety device may be positively oscillated across the front of the press dies in advance of the movement of the press head and held in such operated position during repeated movements of the press head.

4. In a safety device for a power press the combination of a support, a lever mounted on said support, a stud on the upper end of said lever above the mounting thereof and a guard on the lower end of said lever adapted to stand normally at one side of the front of the vertical center of the press dies, a ram on said press, a cam mounted on said ram adapted to engage with said stud on the

downward movement of the ram and swing said guard across the front of said dies on the downward movement of the ram.

5 In a safety device for a power press the combination of a support, a lever mounted on said support, a stud on the upper end of said lever and a guard on the lower end of said lever adapted to stand normally at one side of the front of the vertical center of the
10 press dies, a ram on said press, a cam mounted on said ram adapted to engage with said stud on the downward movement of the ram and swing said guard across the front of said dies on the downward movement of the
15 ram, a treadle for controlling the operation of said press, connections between said treadle and said guard by which said guard may be swung across the front of said dies in advance of the downward movement of the
20 ram and hold said guard stationary during repeated movements of said ram.

6. In a safety device for a power press the combination of a support, a guard mounted

to swing on said support across the front of the press dies and standing normally at one side thereof, means operated by the press for positively causing said guard to swing across the front of said dies during the downward stroke of the press head, said guard being free to remain in its advanced position during the upward movement of the press head. 25 30

7. In a safety device for a punch press the combination of a single vertically disposed guard pivoted at its upper end, means for operating said guard from the treadle and means for independently operating said guard from the ram of the press. 35

Signed at New York, in the county of New York and State of New York, this 5th day of August, A. D. 1913. 40

ALEXANDER McK. KENDRICK.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."