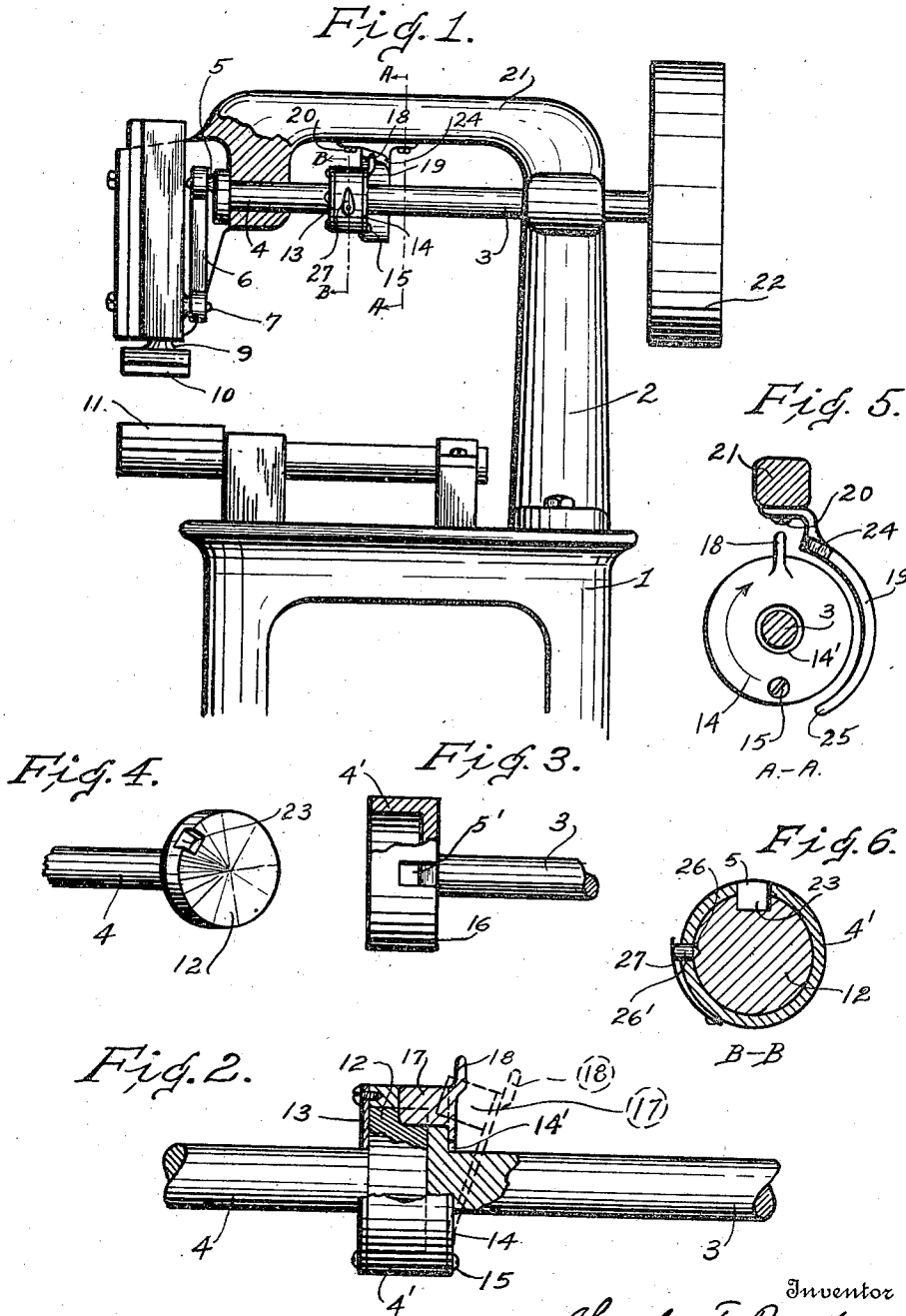


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SAFETY DEVICE FOR STAYING MACHINES.
APPLICATION FILED AUG. 10, 1914.

1,195,401.

Patented Aug. 22, 1916.



Witnesses

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SAFETY DEVICE FOR STAYING-MACHINES.

1,195,401.

Specification of Letters Patent.

Patented Aug. 22, 1916.

Application filed August 10, 1914. Serial No. 855,970.

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 Safety Devices for Staying-Machines and the like, of which the following is a specification.

This invention relates to new and useful improvements in safety devices for staying machines, though equally applicable to any character or type of machine which has a reciprocating work engaging element, for example a punching press.

The primary object of the invention is to provide means incorporated in the driving shaft of the machine for automatically rendering the reciprocating work engaging element inoperative when an obstruction is inadvertently or otherwise placed between the element and the anvil and upon engagement of the element with the obstruction.

Briefly, the invention primarily resides in forming the driving shaft in a number of parts, which parts are coupled and uncoupled automatically so as to effect the necessary positive drive and operation of the work engaging element in case no obstruction is encountered. The coupling of the shaft parts is effected just prior to the engagement of the work by the work-performing element and the same are uncoupled upon the major portion of the downstroke and during the final part of the downstroke the parts are again recoupled so as to positively drive the element, unless an obstruction is engaged by the element, in which latter event the shaft parts continue to remain uncoupled.

In the drawings: Figure 1 is a side elevation, partly broken away and in section, of a staying machine, embodying the present invention; Fig. 2 is a detail side elevation, partly broken away and in section of the coupling means; Fig. 3 is a detail perspective view of one of the coupler elements; Fig. 4 is a side elevation partly broken away and in section, of the other coupler element; Fig. 5 is a section on the line A—A of Fig. 1; and Fig. 6 is a similar view on the line B—B of Fig. 1.

The present illustration of the invention is in connection with a conventional type of staying machine that has a bed 1 and an L-

shaped arm 2. The drive shaft for the reciprocating head 9 that has the follower 10, is however, formed in two parts 3 and 4, the part 4 having an eccentric or crank 5 connected by a link 6 to a stud 7 which is connected to the head 9, the follower 10 of which latter coöperates with the usual anvil 11.

Part 3 of the driving shaft has a cup-shaped or hollow member 4' secured thereto, the latter having a slot 5' which extends through its periphery while the part 4 of the driving shaft has a disk 12 secured thereto, which disk is received within the hollow member 4' and has a notch 23 that is adapted to register with slot 5'. A plate 13 is secured to the member 4' at the open end thereof so as to retain the disk 12 therewithin.

For the purpose of coupling the disk 12 to member 4' and thereby the parts 3 and 4 of the shaft together, a spring plate or disk 14 is attached by a screw 15 to the closed end 16 of the member 4' and carries a coupling block 17 at its free end, which block is freely movable through the slot 5' and into and out of the notch 23, the plate 14 having an aperture 14' through which the shaft part 3 extends, the aperture being sufficiently large to enable the plate to move from the full to the dotted line position shown in Fig. 2 and vice versa.

The means to uncouple the shaft parts 3 and 4, includes an arm 18 secured to the plate 14 and a cam bar 19, which latter is secured by a bolt 20 to the part 21 of the L-shaped arm 2 and is curved in the form of an arc and arranged in surrounding relation to the member 4' so as to be engageable with the arm 18 of plate 14.

A drive pulley 22 is secured to the shaft part 3 to rotate same.

The operation is as follows: The arm 18 is arranged to contact with the uncoupling cam bar 19 just after the time that the head reaches the end of its upward stroke, the arm being positively moved by the shaft part 3, and during the time that the arm 18 is in contact with the uncoupling bar 19 in the down movement of the arm, the spring element 14 is moved by the bar 19 outwardly into the dotted line position shown in Fig. 2, thereby moving the coupling block 17 out of the notch 23 with the result that disk 12 and member 4' are un-

coupled, and the shaft parts 3 and 4 correspondingly are uncoupled. The coupling block 17 remains in its uncoupled position from the time that arm 18 contacts with cam bar 19 at the point 24 until said arm reaches the point 25, and then passes or moves out of engagement with the free end of arm 19, whereupon the arm 18 is released and the spring element 14 being now also released from tension moves from the dotted to the full line position shown in Fig. 2 in which latter position block 17 again enters notch 23 and recouples the parts. The cam bar 19 is made of such length so that when the head is just about at the end of its downward stroke, the arm 18 will have passed beyond the end 25 of bar 19 permitting the block 17 to again enter notch 23 and to thus perform its coupling function. Should however, an obstruction be placed between the anvil and the follower, it will be seen that the follower 10 upon engaging the obstruction, will be arrested, thereby in its downward movement with the result that the shaft part 4 and disk 12 will remain stationary and since the member 4' will move with shaft part 3 the coupling block 17 which is moving with member 4' will be moved to a position out of register with notch 23 and consequently the coupling block 17 cannot enter notch 23 so as to couple the shaft parts 3 and 4, until the obstruction is removed (as for instance the finger) thereby allowing the head to move to the end of its downward stroke by gravity and the part 12 rotates bringing the slot 23 beyond the end 25 of the cam. When the part 3 makes another revolution the part 4' and the part 12 will be in position to be coupled.

The bar 19 is preferably made of a length so that any obstruction greater in thickness than the thickness of the work, the latter usually one-eighth of an inch, will make it impossible to couple the shaft parts 3 and 4.

It will thus be seen that the shaft parts normally are coupled, on the up or idle stroke of the follower and are uncoupled after the link 6 passes its up dead center, the result being that the momentum thus imparted to the link and consequently the follower, upon the passing of the dead center, is sufficient to carry the follower, with the action of gravity, on its down or working stroke, and if no obstruction is present between the follower and anvil, then the shaft parts 3 and 4 will be coupled so as to effect positive drive of the follower on its final movement, or just prior to engaging the anvil.

Disk 12 is provided with a peripheral aperture 26 to receive the end of a pin 26' which latter is tensioned by a light spring 27 secured to member 4' in order to force the pin 26' into aperture 26 when the member

4' is rotated so as to thus cause the disk 12 to rotate with member 4' and with the slot 5' and the notch 23 in registry thereby enabling the coupling block 17 to enter the slot and notch to couple the parts. However, the action of the spring 27 is very light and is not sufficient to retain pin 26' in aperture 26 should the follower 10 engage an obstruction, such as the hand of the operator.

It will be noted that the cam 19 and spring-plate 14, in conjunction, constitute means for rendering the coupling device ineffective for transmitting working power during the greater part of the working stroke of the work-performing element and for rendering the coupling device effective for transmitting working power just prior to the engagement of the work by the work-performing element. Otherwise considered, the cam constitutes one means referred to in certain of the following claims for rendering the coupling device ineffective and the spring-plate constitutes the other means mentioned in certain of the claims for rendering the coupling device effective at the time specified. It is obvious, however, that I do not wish to limit myself to these particular means for accomplishing the above results.

What is claimed is:

1. The combination with a reciprocating work-performing element and a rotary shaft from which said element is actuated, of a power-transmitting device interposed in the length of said shaft, and means controlling the operation of said device and operable thereon in timed relation with the movement of the work-performing element to automatically render said device ineffective for transmitting working power during a part of the operative stroke of the work-performing element and to automatically render said device effective for transmitting working power just prior to the engagement of the work by the work-performing element and when the path of the work-performing element is free.

2. The combination with a reciprocating work-performing element and a rotary shaft from which said element is actuated, of a power-transmitting device interposed in the length of said shaft, means operable thereon in timed relation with the movement of the work-performing element to automatically render the same ineffective for transmitting working power during a part of the working stroke of the work-performing element, and means operable upon said device just prior to the engagement of the work by the work-performing element to automatically render said device effective for transmitting power when the path of the work-performing element is free.

3. The combination with a reciprocating work-performing element and a rotary shaft

from which said element is actuated, of a power-transmitting device interposed in the length of said shaft, and means controlling the operation of said device and automatically operable in timed relation with the movement of the work-performing element to render said device operative and inoperative for transmitting working power.

4. The combination with a reciprocating work-performing element and a rotary shaft from which said element is actuated, of a power transmitting device interposed in the length of said shaft, and means comprising a cam controlling the operation of said device and operable thereon in timed relation with the movement of the work-performing element to render the same ineffective for transmitting working power during a part of the working stroke of the work-performing element, and means operable upon said device just prior to the engagement of the work by the work-performing element to automatically render said device effective for transmitting working power when the path of the work-performing element is free.

5. The combination with a work-performing element, of a rotary shaft to actuate the same, said shaft being divided into a plurality of parts, a coupling member for operatively connecting said parts, and means comprising a cam operable upon said coupling member in timed relation with the movement of the work-performing element to automatically render said coupling member ineffective during a part of the working stroke of the work-performing element and to automatically render the coupling member effective just prior to the engagement of the work by the work-performing element and when the path of the work-performing element is free.

6. The combination with a reciprocating work-performing element, of a rotary shaft for actuating the same, said shaft being divided into a plurality of parts, a normally operative coupling member for operatively connecting said parts, and a cam operable upon said member during the rotation of the shaft and so positioned as to render the coupling member ineffective as the work-performing element starts its operative stroke, said cam being of such length as to render the coupling member effective just prior to the engagement of the work by the work-performing element and when the path of the work-performing element is free.

7. The combination with a reciprocating work-performing element and a rotary shaft for actuating the same, of a power transmitting device associated directly with said shaft, and means operable in timed relation with the movement of the work-performing element to automatically render said device ineffective for transmitting working power during a part of the working stroke of the

work-performing element and for automatically rendering said device effective for transmitting power just prior to the engagement of the work by the work-performing element and when the path of the work-performing element is free.

8. The combination with a reciprocating work-performing element, of a rotary shaft for actuating the same, said shaft being divided into two portions, a coupling member normally effective for transmitting working power from one shaft portion to the other, and means automatically operable in timed relation with the movement of the work-performing element to positively prevent movement of the coupling member to its operative position during a part of the working stroke of the work-performing element, said means being designed to automatically permit movement of the coupling member to its operative position just prior to the engagement of the work by the work-performing element and when the path of the element is free.

9. The combination with a reciprocating work-performing element, of a rotary member for actuating the same, said member being divided into two portions, a coupling device interposed between said portions, and means automatically operable upon said coupling device and operable in timed relation with the movement of the work-performing element to positively prevent operation of said coupling device until the work-performing element is in close proximity with the work and when the path of the work-performing element is free.

10. The combination with a reciprocating work-performing element and a sectional rotatable driving member, of a coupling device between the sections of said driving member, said coupling device being ineffective for transmitting working power during a part of the working stroke of the work-performing element, and means for automatically rendering said coupling device effective for transmitting working power just prior to the engagement of the work by the work-performing element and when the path of the work-performing element is free.

11. The combination with a reciprocating work-performing element, of a sectional rotatable driving member, a coupling device for the sections of the driving member, a yieldable coupler for yieldingly connecting the sections of the driving member, and means for automatically actuating said coupling device to coupling position when the path of the work-performing element to the work is free.

12. The combination with a reciprocating work-performing element, of a sectional rotatable driving member, means to yieldably connect the sections of the driving member,

means to positively couple said sections to
effect synchronous movement thereof, and
means for automatically actuating the last-
named coupling means to coupling position
5 when the path of the work-performing ele-
ment to the work is free.

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

CHARLES F. ROOT.

Witnesses:

JOHN H. COSS,
LELA RITCHIE.