July 3, 1923. 1,460,465

G. H. WOOD ET AL

SAFETY MEANS FOR CUTTING MACHINES

Filed Sept. 11, 1920 3 Sheets-Sheet 1

Fig. 2.

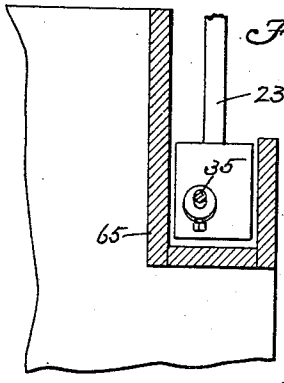

Fig. 1.

Inventors
George H. Wood
Fred L. Capen
By Wright Brown Quinby & May
Attorneys

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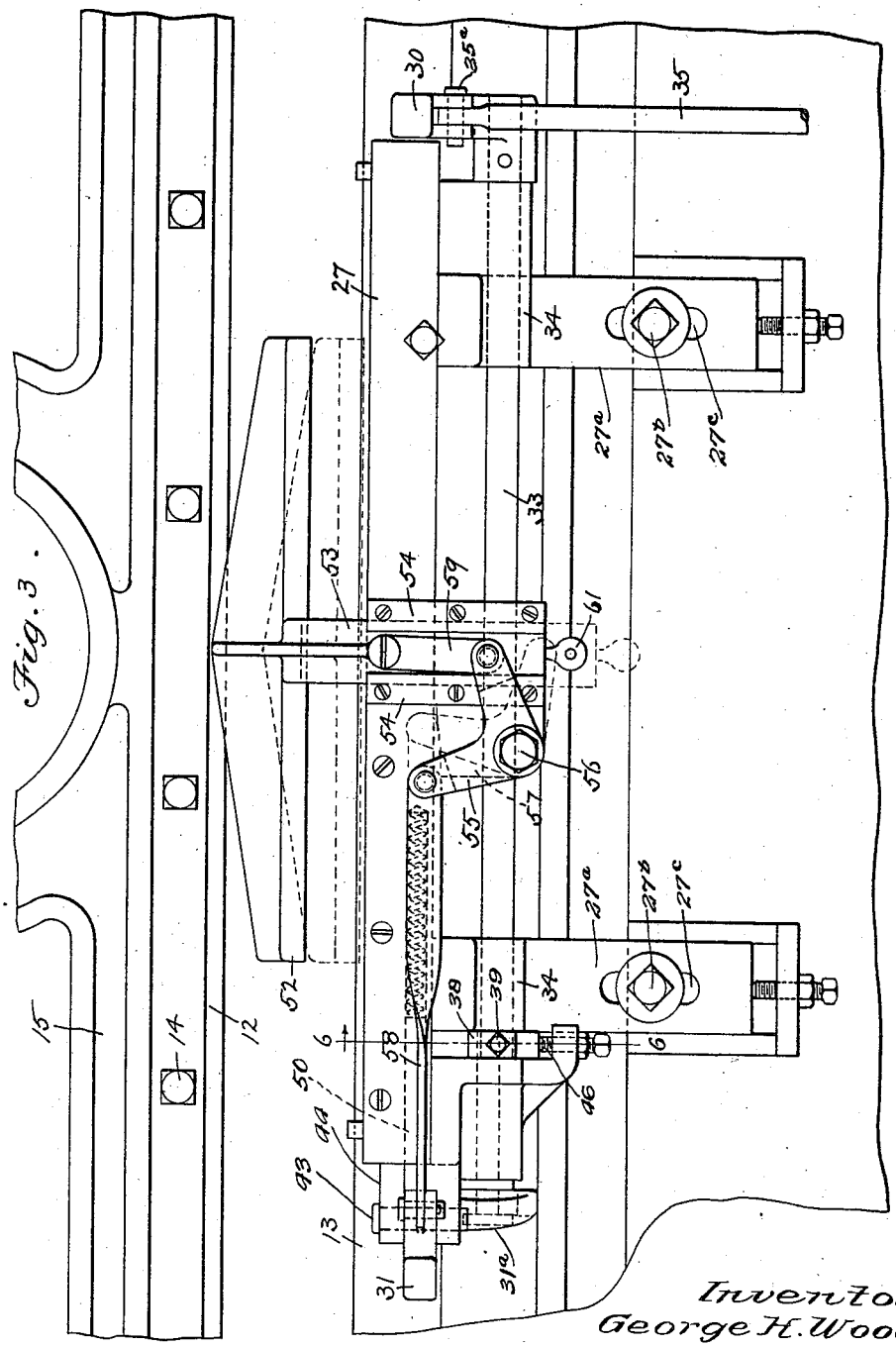

Fig. 3.

Inventors
George H. Wood
Fred L. Capen
by Wright Brown Quinby & May
Attorneys

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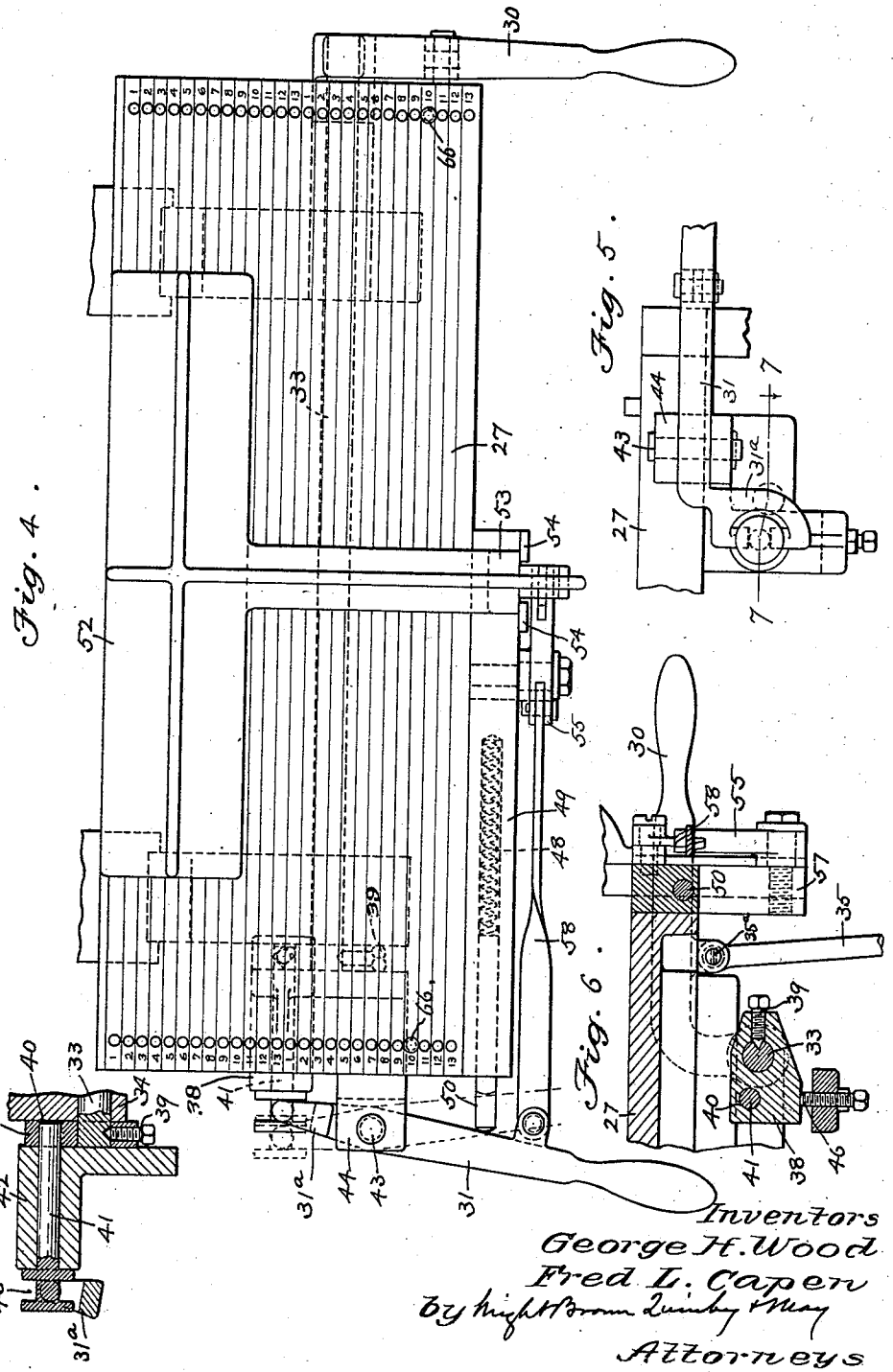
3 Sheets-Sheet 3



Inventors
George H. Wood
Fred L. Capen
by Wright Brown Quinby & May
Attorneys

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UNITED STATES PATENT OFFICE.

GEORGE H. WOOD AND FRED L. CAPEN, OF BOSTON, MASSACHUSETTS.

SAFETY MEANS FOR CUTTING MACHINES.

Application filed September 11, 1920. Serial No. 409,677.

To all whom it may concern:

Be it known that we, GEORGE H. WOOD and FRED L. CAPEN, citizens of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Safety Means for Cutting Machines, of which the following is a specification.

This invention relates to a cutting machine which includes a reciprocating cutter, which may be an elongated stripping knife adapted to cut a strip from a sheet of leather supported by a cutting bed, and operating mechanism having provisions for depressing and raising the cutter, and for automatically stopping the cutter in a raised position, said mechanism including a cutter-starting element movable by the operator to start the machine, and causing an operative depression of the cutter.

The chief object of the invention is to provide a machine of this character with safety means requiring the simultaneous employment of both hands of the operator in starting the machine, at such a distance from the cutter as to prevent the possibility of injury to either hand by the cutter during the operation of starting the machine.

Another object is to provide means other than the operator's hand or hands for clamping and confining the work in position for action thereon by the cutter, and thus rendering it unnecessary for the operator to endanger his hands by employing them to hold the work.

The invention is embodied in the improvements which we will now proceed to describe and claim.

Of the accompanying drawings forming a part of this specification,—

Figure 1 is an end elevation of a leather-stripping machine, provided with safety means embodying the invention.

Figure 2 is a fragmentary section on line 2—2 of Figure 1.

Figure 3 is a fragmentary front elevation, showing parts of the machine.

Figure 4 is a top plan view of the portions of the machine shown by Figure 3, the knife and knife-carrying cross-head being omitted.

Figure 5 is a fragmentary view, showing an enlargement of a portion of Figure 1.

Figure 6 is a section on line 6—6 of Figure 3.

Figure 7 is a section on line 7—7 of Figure 5.

The same reference characters indicate the same parts in all of the figures.

In the drawings, 12 represents the cutting knife, and 13 the cutting bed of a well-known leather-stripping machine. The bed, which is usualy an elongated block of wood, is suitably attached to the frame of the machine, and the knife is attached as by bolts 14 to a vertically-movable cross-head 15, guided by fixed upright guide-rods at opposite ends of the frame, one of said guide rods being shown at 16 in Figure 1. The end portions of the cross-head are provided with vertical orifices receiving said guide rods. The cross-head is reciprocated on the guide rods 16 by suitable well-known mechanism, including a power-driven shaft 17, journaled in bearings in the lower portion of the frame, and having eccentric wrist pins 18 at its opposite ends, and connecting-rods 19 engaged with said wrist-pins and pivoted at 20 to rods 21, fixed to and projecting downward from the opposite end portions of the cross-head.

Suitable mechanism is provided for starting and automatically stopping the shaft 17, the shaft stopping when the cross-head and knife are raised.

Said mechanism, as here shown, includes a treadle lever 23, fulcrumed at 24, the longer arm of said lever being normally raised, and arranged to be depressed by an operator standing at the front of the machine, that is, at the right of Figure 1. The said mechanism also includes a clutch, an element of which is shown at 25 (Figure 1), and means cooperating with the clutch to transmit torque from a motor to the shaft 17, the clutch being inoperative when the lever 23 is in its normal position, and rendered operative by the depression of the lever. The lever 23 is yieldingly held in its normal position by means such as a weight 23^a, suitably connected with the shorter arm of the lever.

Starting and stopping mechanism of this character being well known, further illustration and description of the same are deemed unnecessary, it being sufficient to say that the crosshead and knife are normally held at rest in a raised position, are caused by each depression of the treadle

23 to make one downward movement and one upward movement, and are automatically arrested at the end of the upward movement, the downward movement causing the knife to cut a strip from a sheet 26 of leather resting on the bed 13.

The machine is provided at its front portion with a work support including a table 27, arranged to support the forward end portion of the sheet 26 and the strip cut therefrom, and table-supporting means embodied in brackets 27[a] fixed to the table, and bolts 27[b] passing through slots 27[c] (Figure 3) in the brackets and engaged with the frame of the machine, the said work-support being thus removably secured to the frame. The machine is provided at its rear portion with suitable sheet-guiding means, here shown as composed of a horizontal table portion 29, and an inclined table portion 28. The structure thus far described is embodied in what is known as the Knox leather-stripping machine. We have selected this type of machine to illustrate our invention hereinafter described, without intending thereby to limit ourselves to this particular machine. It should be understood that the parts of the machine shown by the drawings, and not either hereinbefore or hereinafter described, are well known and not essential to an understanding of our invention.

In accomplishing the previously stated objects of our invention, we employ safety mechanism carried entirely by the said work-support, and preferably embodied as next described.

We provide two manually movable levers 30 and 31, located at opposite end portions of the work-support in position to be grasped simultaneously by the two hands of an operator standing at the front of the machine, one of these being called the starting lever, and the other the unlocking lever. The starting lever 30 is fixed to a horizontal rock-shaft 33, journaled in fixed bearings 34 on the table-supporting brackets 27[a], the lever being therefore adapted to swing in a vertical plane. The starting lever 30 is an element of means for imparting a machine-starting movement to the lever 23, and to this end, the levers 30 and 23 are connected by a rod 35, pivoted at 35[a] (Figures 4 and 6) to ears on the lever 30, and adapted to depress the lever 23 when the lever 30 is depressed by the operator, the rod 35 having a fixed collar 36 bearing on the lever 23.

We also provide means for automatically locking the lever 30 in its inoperative (raised) position, and, manually operable means, of which the unlocking lever 31 is an element, for unlocking the lever 30 to permit the depression of the latter, the arrangement being such that, to start the machine, the operator has to simultaneously grasp the levers 30 and 31, so that both hands are necessarily out of the path of the reciprocating knife and free from liability of being cut by the knife. The automatic locking means here shown, includes the rock-shaft 33, to which the starting lever is attached, and connections between the unlocking lever and the rock-shaft organized to lock the rock-shaft when the unlocking lever is held in an operative or locking position by the means hereinafter described, and to release the rock-shaft when the unlocking lever is moved from said position.

In the embodiment of the invention here shown, said connections include a short arm 38 (Figure 6) attached as by a set screw 39 to the rock-shaft, said arm having a bolt hole 40, and a locking bolt 41 movable in a fixed guide 42 secured to the work-support, and adapted to enter the arm 38, as best shown by Figure 7, and thus prevent a turning movement of the rock-shaft 33.

The unlocking lever 31 is fulcrumed at 43 to ears 44 fixed to the work-support, and has a forked inner and shorter arm 31[a], provided with studs engaging a groove 45 formed by two collars or flanges on the bolt 41, so that a movement of the unlocking lever from the position shown by full lines to that shown by dotted lines in Figure 4, retracts the bolt and releases the rock-shaft 33, thus permitting the described starting movement of the starting lever 30 by the operator.

The rock-shaft arm 38 is normally held by the weight 23[a] against a stop member 46 (Figure 6), fixed to the machine frame, the bolt hole 40 being thus normally held in position to receive the bolt 41, said weight acting through the lever 23, rod 35, starting lever 30, and rock-shaft 33, to hold the arm 38 in its normal position. The bolt 41 is yieldingly projected by a spring 48 housed in a socketed member 49 fixed to the work-support, and a sliding pin 50, pressed by said spring against the unlocking lever 31, said spring and pin normally holding the unlocking lever in the operative or locking position shown by full lines in Figure 4.

It will now be seen that the operator, before depressing the starting lever to start the machine, must grasp the unlocking lever and move the latter to unlock the starting lever, so that both hands are safely located during the cutting operation, and that upon the release of the starting and unlocking levers, and the return of the knife to its raised position, the starting lever is automatically locked in its inoperative position.

Over the front table 27 of the work-support is located a clamping member 52, adapted to hold the forward end of the sheet 26 down upon the table and thus re-

lieve the operator from the necessity of holding down the sheet by a hand possibly located in the path of the knife.

Said clamping member is preferably depressed to hold the sheet by connections with the unlocking lever 31, the arrangement being such that a movement of the unlocking lever to unlock the starting lever, depresses the clamping member, the return movement of the unlocking lever to its normal position raising the clamping member.

To the clamping member 52 is fixed a vertical slide 53, movable between guides 54, fixed to the front of the work-support 27. The preferred connections between the unlocking lever 31 and the clamping member 52 are embodied in a bell-crank lever 55, fulcrumed at 56 to an ear 57 fixed to the work-support, a link 58 connecting one arm of lever 55 with the unlocking lever, and a link 59 connecting the other arm of the bell-crank lever with the slide 53. If desired, however, the clamping member may be depressed and raised by other means, connected with an eye 61, on the slide 53.

In operating the machine, the operator places the front edge of the sheet 26 against the usual stop pins 66, adjustably mounted on the table 27, then grasps the starting and unlocking levers, then moves the unlocking lever to unlock the starting lever, and finally moves the starting lever to start the machine, the clamping member 52 being depressed, preferably by the described connections between said member and the unlocking lever, just before the knife descends.

To prevent access of the operator's foot to the starting treadle lever 23, and thus prevent the operator from starting the machine without the simultaneous use of both hands, we provide a box-like guard 65, enclosing the outer end portion of the lever 23, as shown by Figures 1 and 2.

The treadle lever 23 constitutes the usual foot-controlled cutter-starting element of the mechanism provided for operating the cutter, in a machine of the general construction here shown. The hand lever 30 constitutes a hand-controlled cutter-starting element of said mechanism, the lever 23 and rod 35 constituting connections between the lever 30 and the usual clutch, and therefore, forming other cutter-starting elements cooperating with the lever 30. The lever 23 may be called a primary starting lever, and the lever 30 an auxiliary starting lever. The lever 31 is an element of the means employed for unlocking the starting element, and is therefore an unlocking element.

It will be seen, particularly by reference to Figure 1, that an existing machine including a main frame, a cutter, a cutting bed, cutter-operating mechanism adapted to be started by a treadle lever 23, and a work-support of the usual type, not provided with safety mechanism, may be converted into a machine embodying the invention, by removing the usual work-support, and substituting therefor a work-support equipped with the described safety mechanism, the work-support and safety-mechanism being attachable as a unit to the frame of the machine.

We claim:

1. A cutting-machine comprising, in combination, a movable cutter; a cutting bed; operating mechanism having provisions for raising and depressing the cutter; a primary starting lever located below the cutting bed; and operable by its depression to start the operating mechanism; a work-support including a front table adjacent to the cutting bed, and table-supporting means detachably connected with the frame of the machine; and a safety mechanism supported wholly by said work-support, and adapted to be manually operated to cause the depression of the said primary lever and the operation of the cutter, said safety mechanism including an auxiliary starting lever located above the primary lever, at one end of the work-support, and formed and arranged to be grasped by one hand of the operator, a rod depending from the auxiliary lever and connected with the primary lever, and automatic means normally locking the auxiliary lever in an inoperative position, said means including a rock-shaft fixed to the auxiliary lever and journaled in bearings on the work support, an unlocking lever located at the opposite end of the work support and yieldingly held in an operative or locking position, and connections between the unlocking lever and the rock-shaft organized to lock the rock-shaft when the unlocking lever is in its operative position, and to release the rock-shaft when the lever is moved from said position by the other hand of the operator to unlock the primary lever, the said work-support and safety mechanism being attachable as a unit to the frame of the machine.

2. A cutting-machine comprising, in combination, a movable cutter; a cutting bed; operating mechanism having provisions for raising and depressing the cutter; a primary starting lever located below the cutting bed; and operable by its depression to start the operating mechanism; a work-support including a front table adjacent to the cutting bed, and table-supporting means detachably connected with the frame of the machine; and a safety mechanism supported wholly by said work-support, and adapted to be manually operated to cause the depression of the said primary lever and the operation of the cutter, said safety mechanism including an auxiliary starting lever located above

the primary lever, at one end of the work-support, and formed and arranged to be grasped by one hand of the operator, a rod depending from the auxiliary lever and connected with the primary lever, a rock-shaft fixed to the auxiliary lever and journaled in bearings on the work-support, said shaft extending from end to end of the work-support, a bolt-engaging arm fixed to one end of the rock-shaft, a locking bolt movable in a fixed guide on the work-support and adapted to engage said arm and lock the rock-shaft and the auxiliary lever, and an unlocking lever fulcrumed on the opposite end of the work-support and formed to be grasped by the other hand, one arm of the unlocking lever being engaged with the locking bolt to project and retract the latter, means being provided for normally holding the unlocking lever in its bolt-projecting position, the said work-support and safety mechanism being attachable as a unit to the frame of the machine.

3. A cutting-machine comprising, in combination, a movable cutter; a cutting bed; operating mechanism having provisions for depressing and raising the cutter; a primary starting lever located below the cutting bed; means operable by the depression of said lever to start the operating mechanism; a work-support including a front table adjacent to the cutting bed, and table-supporting means detachably connected with the frame of the machine; a safety mechanism supported wholly by the work-support, and including a cutter-starting element formed and arranged to be grasped by one hand of an operator, a rod connecting the cutter-starting element with the primary starting lever, automatic means normally locking said starting element in an inoperative position, said automatic means including an unlocking element formed and arranged to be grasped by the other hand of the operator; a clamping member movable toward and from the table; and connections between the clamping member and the unlocking element whereby the clamping member is depressed by an unlocking movement of the unlocking element, and raised from the table by the return of the unlocking element to its operative position.

4. A cutting-machine comprising a movable cutter; a cutting bed; operating mechanism having provisions for depressing and raising the cutter; a primary starting lever located below the cutting bed; means operable by the depression of said lever to start the operating mechanism; a work-support including a front table adjacent to the cutting bed, and table-supporting means detachably connected with the frame of the machine; a safety mechanism supported wholly by the work-support, and including an auxiliary starting lever formed and arranged to be grasped by one hand of an operator and operatively connected with the primary lever, automatic means normally locking the auxiliary starting lever in an inoperative position, said automatic means including an unlocking lever formed and arranged to be grasped and moved by the other hand of the operator, to unlock the auxiliary starting lever, a guide on the work-support, a clamping member provided with a guide-directed slide and movable toward and from the work-support, and connections between said slide and the unlocking lever, whereby the clamping member is depressed toward the work-support by a movement of the unlocking lever, in one direction, and is raised from the work-support by a movement of the unlocking lever in the opposite direction.

5. A cutting-machine substantially as specified by claim 4, the connections between the slide and the unlocking lever comprising a bell-crank lever fulcrumed on the work-support, and links connecting said bell-crank lever with the unlocking lever and the slide.

6. A cutting-machine comprising a movable cutter; a cutting bed; operating mechanism having provisions for depressing and raising the cutter; a cutter-starting element formed and arranged to be grasped by one hand of an operator; automatic means normally locking said starting element in an inoperative position, said automatic means including an unlocking element formed and arranged to be grasped and moved by the other hand of the operator to unlock the starting element, the arrangement being such that the use of both hands of the operator is required to cause the operation of the machine; a work-supporting table adjacent to the cutting bed; and a normally raised and inoperative clamping member adapted to confine the work on said table, means being provided whereby the operator may depress said member to render the same operative while both hands are employed in causing the operation of the machine.

In testimony whereof we have affixed our signatures.

GEORGE H. WOOD.
FRED L. CAPEN.