March 15, 1927. 1,620,836

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ELECTRICAL STOP MECHANISM FOR LOOMS

Filed May 19. 1924. 5 Sheets-Sheet 1

Fig. 1.

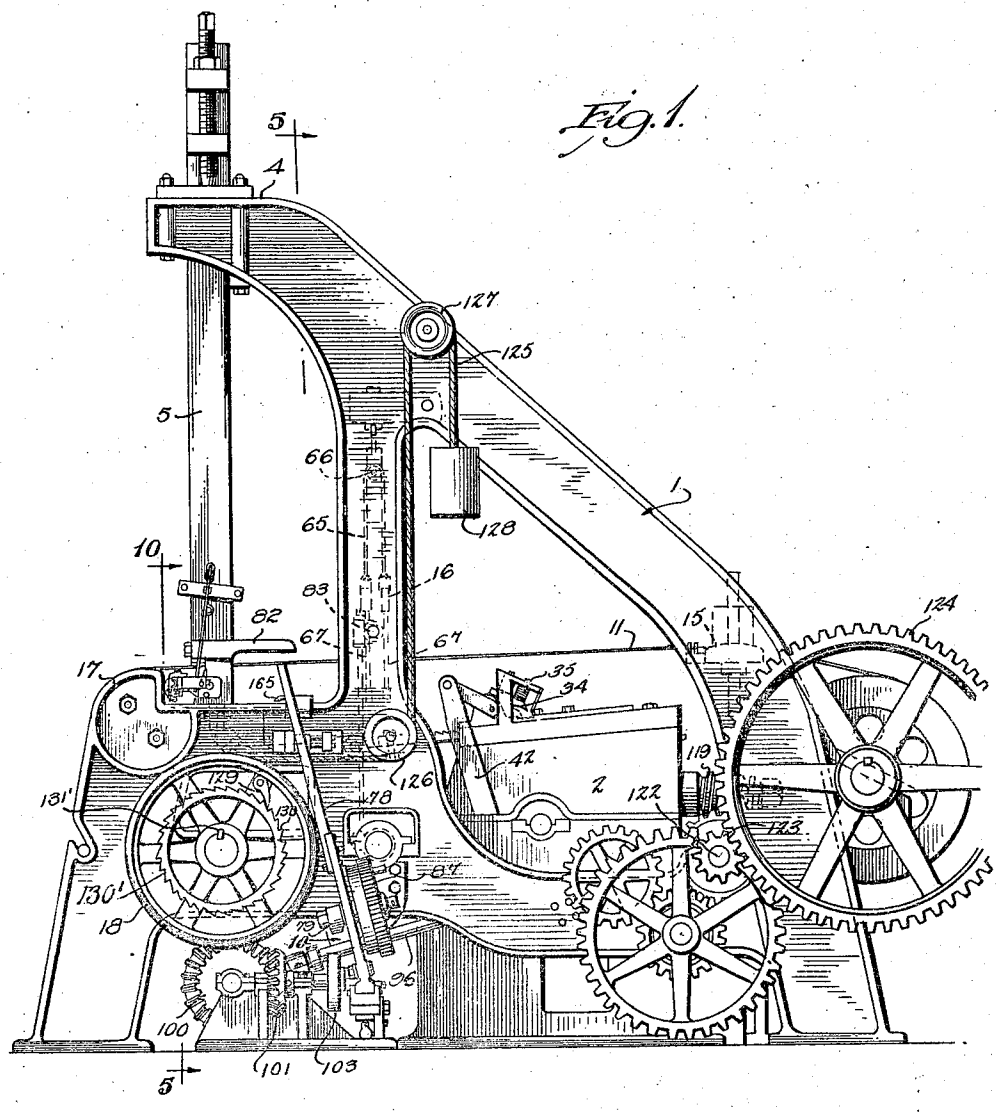
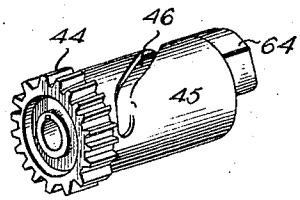


Fig. 10



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ELECTRICAL STOP MECHANISM FOR LOOMS

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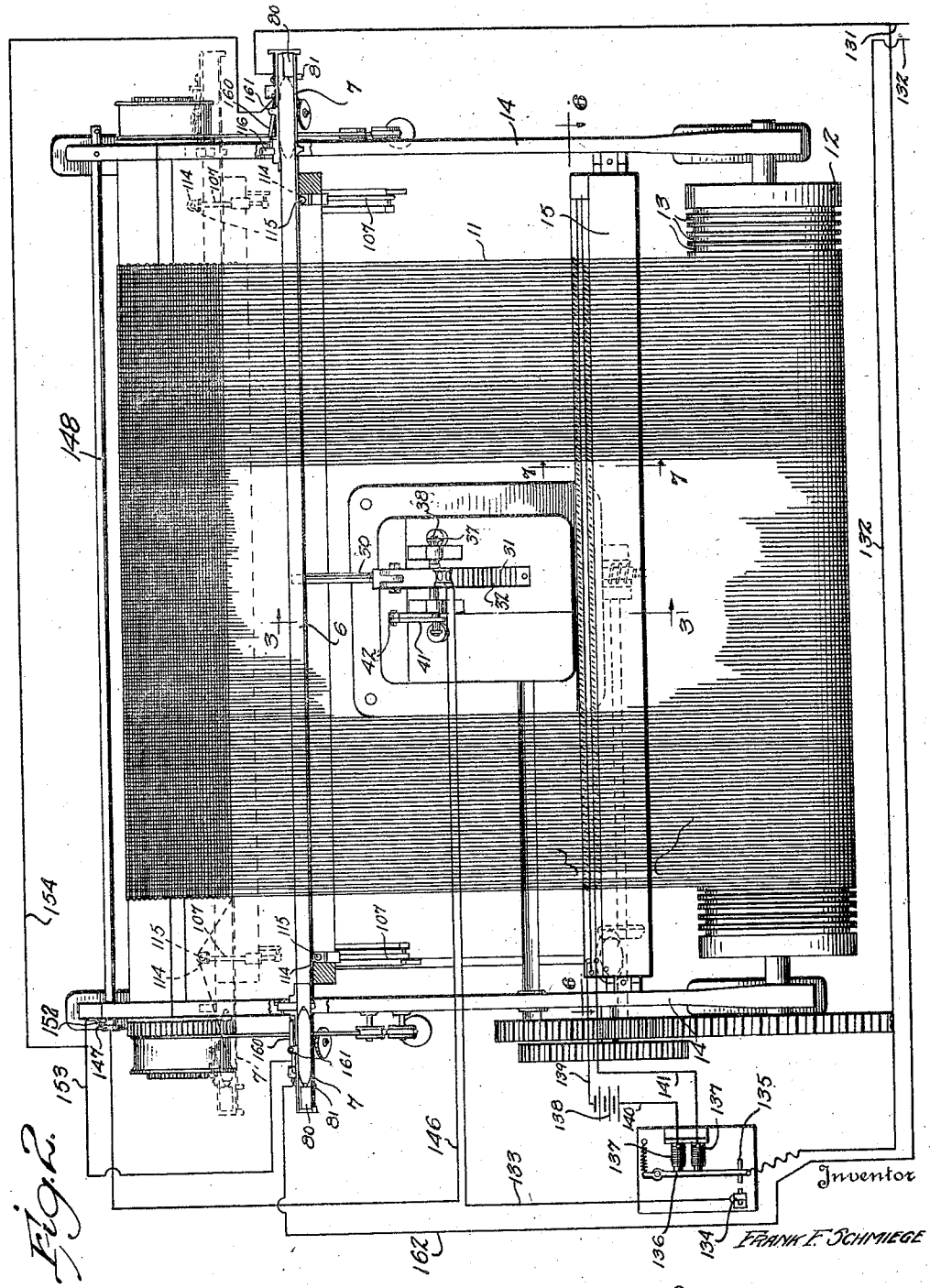


Fig. 2.

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ELECTRICAL STOP MECHANISM FOR LOOMS

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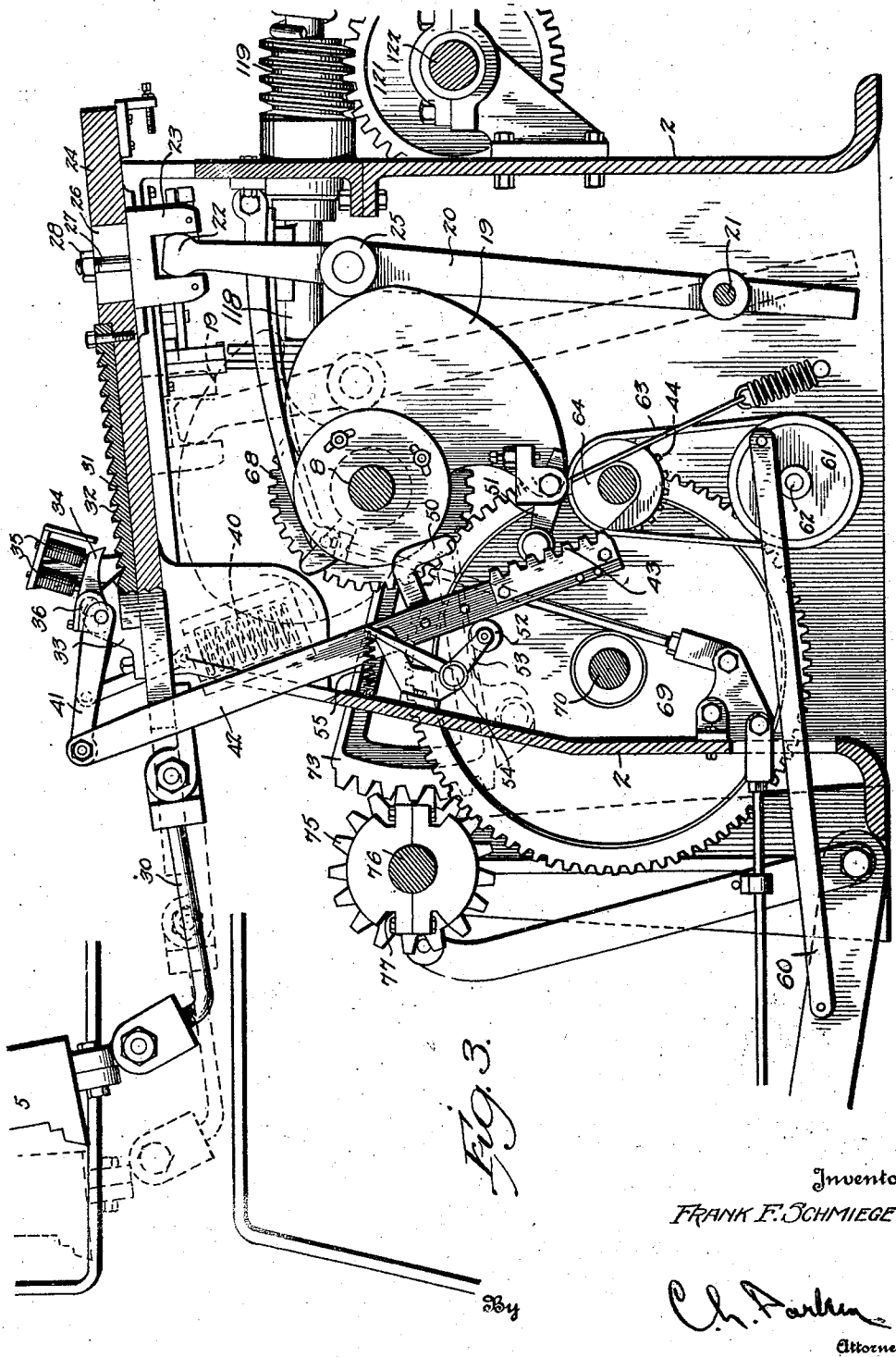


Fig. 3.

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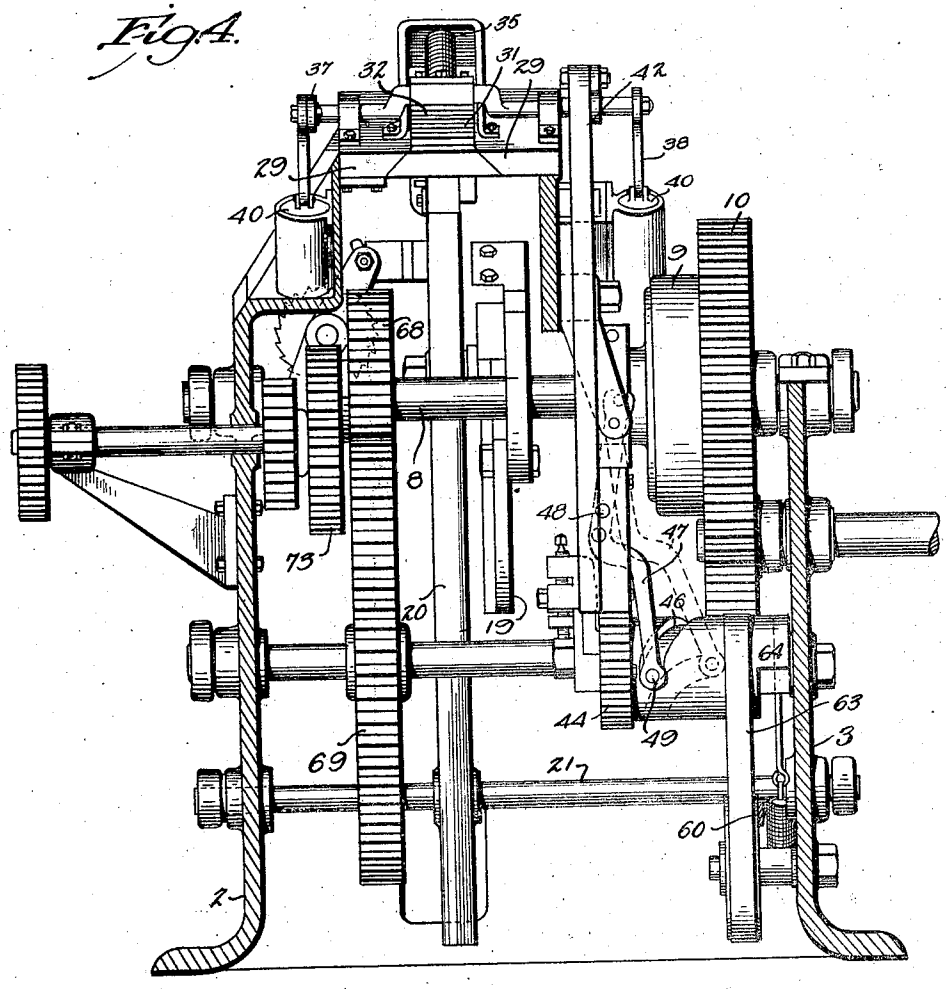
March 15, 1927. 1,620,836

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ELECTRICAL STOP MECHANISM FOR LOOMS

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Fig. 4.



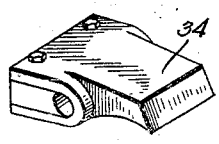


Fig. 11.

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ELECTRICAL STOP MECHANISM FOR LOOMS

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Fig. 5

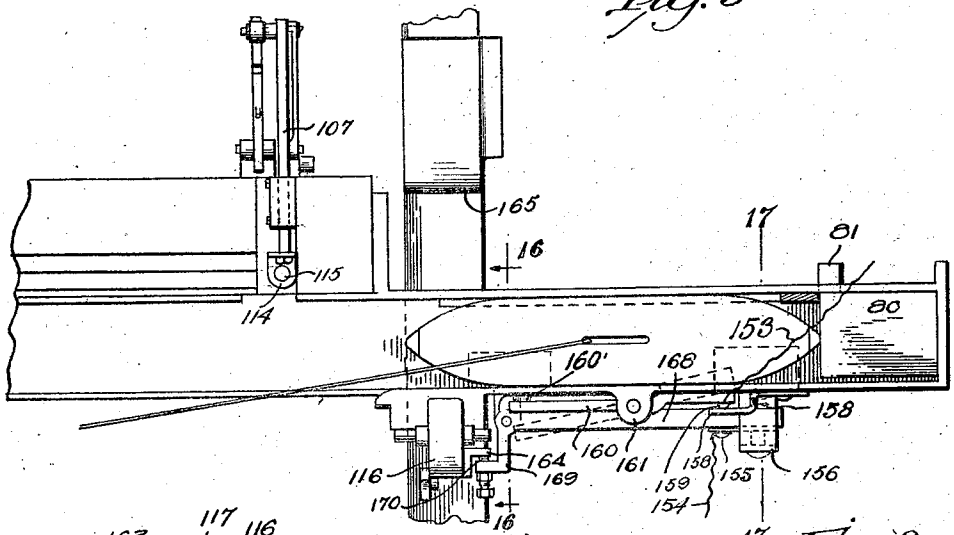
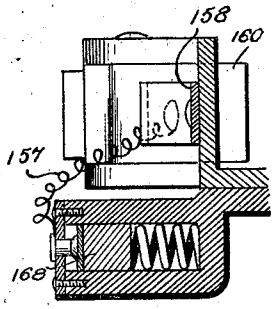


Fig. 8.



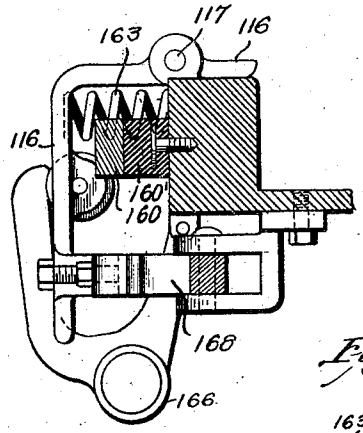


Fig. 7.

Fig. 6.

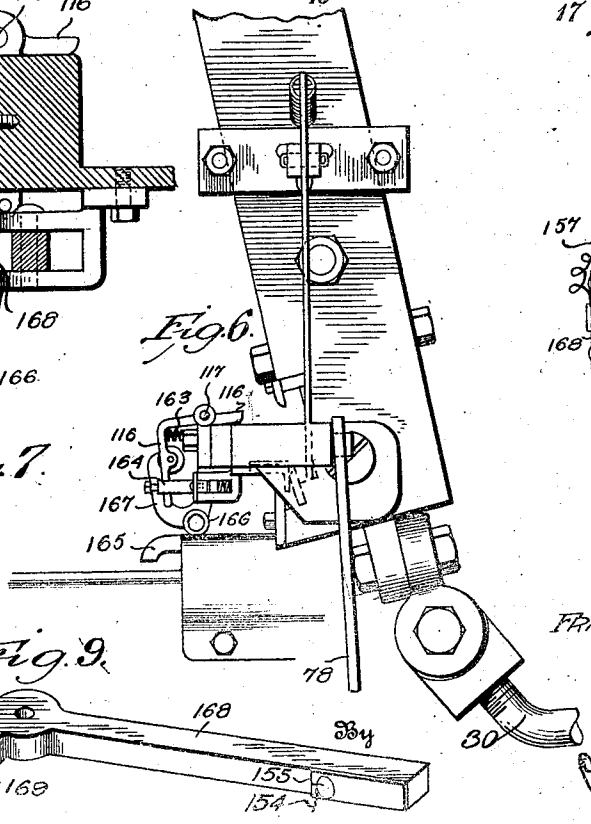


Fig. 9.

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Patented Mar. 15, 1927. 1,620,836

UNITED STATES PATENT OFFICE.

FRANK F. SCHMIEGE, OF APPLETON, WISCONSIN.

ELECTRICAL STOP MECHANISM FOR LOOMS.

Application filed May 19, 1924. Serial No. 714,486.

This invention relates to looms, and more particularly to electrical stop mechanism therefor.

An object of the invention is to provide a loom having a free swinging slay, the movement of which is controlled by a circuit which is completed by the shuttle entering the shuttle box.

A further object of the invention is to provide a control circuit operable by a small amount of current whereby sparking is reduced to a minimum.

A still further object is to provide a control mechanism in which breaking of either the shuttle circuit or the main circuit controlled thereby will cut off the power from the slay and stop the machine.

In the accompanying drawings, I have shown one embodiment of the invention. In this showing:

Figure 1 is a side elevation, parts being shown in section,

Figure 2 is a plan view,

Figure 3 is a vertical sectional view on line 3—3 of Figure 2,

Figure 4 is a vertical sectional view on line 4—4 of Figure 3,

Figure 5 is a plan view of one of the shuttle boxes and a portion of the slay,

Figure 6 is a side elevation of a portion of the slay showing the shuttle box in end elevation,

Figure 7 is a detail sectional view on line 7—7 of Figure 5,

Figure 8 is a similar view on line 8—8 of Figure 5,

Figure 9 is a perspective view of a contact lever carried by the shuttle box,

Figure 10 is a perspective view of a cylindrical cam, and

Figure 11 is a detail view of a dog adapted to engage a ratchet carried by the slay to stop the movement of the slay.

General construction.

The machine comprises a suitable frame consisting of side members 1 connected at the front and rear by means of plates 2 and 3. The side members extend upwardly, forming a support 4 above the bed adapted to pivotally support a slay 5. The slay is provided with the usual shuttle track 6, having shuttle boxes 7 arranged in its opposite ends. The loom is provided with a main shaft 8 having a clutch 9 arranged thereon, and the loose element of the clutch is provided with a gear 10 by means of which power is transmitted to the machine.

In Figure 2 of the drawings, I have shown warp wires 11, which are fed from a back beam 12 in the usual manner. This beam is provided with grooves 13 to space the wires from each other. The machine is provided with side bars 14, forming a support for a guide 15 over which the wires are passed. Suitable heddles 16 are arranged in the path of the wire beyond the guide bar 15, and the woven cloth passes over a breast beam 17 to a take-up or cloth roll 18.

Slay operating mechanism.

The main shaft 8 is provided with a pair of cams 19 and a lever 20 is pivotally mounted on a suitable pin or shaft 21 and arranged adjacent these cams. The upper end of the lever is provided with a head 22 received in a chuck 23 carried by a ram 24. Between the pivot 21 and the head 22, the lever is provided with a roller 25, adapted to engage the cams. As shown, the ram is provided with an elongated slot 26, adapted to receive a bolt 27 carried by the chuck. This bolt is retained in position by means of a nut 28, permitting adjustment of the throw of the slay. The ram 24 is dovetailed in shape and is received in a similar shaped groove or slot in the bed 29 of the machine. The lower end of the slay is connected to the ram by a rod or link 30. It will be apparent that the reciprocation of the lever 20 by the cams 19 will move the ram on the bed of the machine and thus swing the slay forwardly and rearwardly on its pivot. Suitable means are provided for stopping the slay at any point due to broken wires or other defects. As shown, a plate 31 is secured to the ram and this plate is provided with ratchet teeth 32. A bracket 33 is mounted on the bed and this bracket carries a dog 34. The front end or toothed end of the dog is biased toward a position in engagement with one of the ratchet teeth 32. The dog is normally retained in raised position by means of electromagnetic coils 35 which are normally energized when the machine is in operation.

The dog 34 is mounted on a shaft 36 and an arm 37 is rigidly connected to this shaft. This arm is connected to a link 38 arranged in a dash-pot cylinder 39 and engaging a coil spring 40 to cushion the stoppage of the

slay. An arm 41 is also connected to the shaft 36 and the other end of this arm is connected to a push rod 42. A rack 43 is arranged on the lower end of the push rod and this rack, when lowered, is adapted to engage a gear 44. The gear 44 is formed on the end of a cylinder 45 (see Figure 10) and this cylinder is provided with a cam groove 46. A lever 47 is pivoted to the frame of the machine, at 48, and the lower end of this lever carries a pin 49 which rides in the groove. The upper end of the lever is connected to one element of the clutch 9 and disengages the clutch when the cylinder 45 is revolved and the lever 47 moved to the dotted line position shown in Figure 4 of the drawings.

To start the loom, it is necessary to return the push rod 42 to its normal position to disengage the rack 43 from gear 44. The push rod is provided with a bumper 50 arranged above the rack and this bumper is adapted to engage a lever 51 after the rack is in mesh with the gear. The engagement of the bumper and the lever forces the rod to move in a clockwise direction in Figure 3 of the drawings, disengaging the rack from the gear. The roller 52 engages the opposite side of the rod and this roller is mounted in a bracket 53 pivoted to the frame of the machine, at 54. The roller tends to force the rod to an operative position by means of a spring 55 secured to the opposite end of the bracket. A link 60, operated in any desired way, is connected to a disk 61, mounted on a suitable shaft 62 beneath the cylinder 45. A belt or chain 63 passes over the disk 61 and over a cam 64 carried by the cylinder 45. In the return to normal position, the rack 43 is held out of engagement with the gear 44 until the bumper 50 has raised the lever 51 over center and the action of spring 55 on the roller 52 forces the bumper rod 42 back to its normal position.

Heddle operating mechanism.

The heddle frames 16 are connected to suitable chains 65 extending upwardly over a pulley 66 on the frame of the machine and are similarly connected to chains 67 extending downwardly. A gear 68 is mounted on the main shaft and meshes with a gear 69 on a shaft 70. This gear is adapted to actuate the heddle mechanism in any suitable manner.

Picker stick operating mechanism.

A picker stick 78 is pivotally mounted in a bracket at each side of the machine (see Fig. 1) and the picker sticks are adapted to throw the shuttle from one side of the machine to the other in the usual manner. A shoe 80 is arranged in the end of each shuttle box (see Fig. 5) and the shoe is provided with a projection 81 extending from one side of the shuttle box and adapted to be engaged by the picker stick, as the slay reaches its rearward position.

Warp wire tensioning mechanism.

A shaft 118 is driven from the main source of power in any suitable manner and this shaft is provided with a worm 119 (see Figure 3) mounted on the shaft to permit longitudinal movement and retained in position by a spring 120. A worm wheel 121 on a shaft 122 meshes with the worm 119 and the shaft 122 is provided with a pinion 123, meshing with a gear 124 on the back beam. The cloth take-up roll 18 is loosely (see Fig. 3) mounted on its shaft and is provided with cables 125 passing over idler pulleys 126 and passing over pulleys 127 adjacent the top of the machine. Weights 128 are arranged on the ends of the cable. The take-up roll is further provided with a pawl 129 adapted to engage one of the ratchet teeth 130 of a ratchet wheel 130′ which is keyed to the take-up shaft, as at 131′, to prevent rearward movement of the take up roll. The spring 120 relieves the worm 119 of rigidity and removes strain from the warp wires when a blow is struck by the slay to drive the weft in place.

Automatic control mechanism.

Referring to Figure 2 of the drawings, the loom is connected to a source of current by main lead wires 131 and 132. The coils 35 on the bed of the machine are connected to wire 132 by a wire 133 which connects to a stationary contact 134. The contact 134 is adapted to be engaged by a contact 135 carried by an armature 136. When the machine is in operation, the contacts 134 and 135 are closed. The armature 136 is adapted to be attracted by coils 137 arranged in a separate circuit and connected to a source of current 138. The source of current is provided with a lead wire 139 and a second wire 140 extends from the opposite side of the source of current to the coils 137. A wire 141 is connected to the opposite side of the coils. The wires 139 and 141 are connected to the frame of the machine. The wires are normally disconnected but suitable means are provided (not shown) for electrically connecting them upon breakage of a warp wire. This energizes the coils 137 to open the switch 134—135 and thus break the main circuit.

The opposite side of the coils 35 is provided with a lead wire 146, connected to a contact 147 on the frame of the machine. The contact 147 forms one element of a manually operable switch controlling the main circuit and permitting the operator of the machine to make or break the circuit when desired. A lead wire 153 is connected to the other element of the switch, ex-

tends to one shuttle box and a branch wire 154 extends from the wire 153 to the other shuttle box. The wire 154 is connected to a contact 155 carried by a lever 168 pivoted on the side of the shuttle box. This contact is normally in engagement with a contact 156 on the shuttle box to complete the circuit. From the contact 156, a lead wire 157 extends to a contact 158 on the shuttle box and this contact is adapted to be engaged by a contact 159 on binder lever 160 which is pivotally supported in an ear 161 on the side of the shuttle box (see Figure 5). The contact 159 is connected to the wire 153 either directly or through a branch wire 162.

The detail construction of the switches on the shuttle box is shown in Figures 5 to 9 of the drawings. As shown, the contacts 158 and 159 are adapted to be closed by the outward movement of the end of the binder lever when the shuttle enters the shuttle box. During the period that the shuttle is traveling from one shuttle box to the other, these contacts are spaced due to the dotted line position of the binder lever shown in Figure 5 of the drawings, and the slay is, of course, stationary. When the shuttle enters the shuttle box, the circuit is closed by these contacts to again actuate the slay. The binder lever is normally retained in the dotted line position shown by means of a rubber bumper or spring 160′, arranged on the other end of the binder lever. The contacts 154 and 155 are controlled by a spring 163 (see Figure 16). This spring is arranged between the frames and the lever 116 which is pivoted on the shuttle box and retains the weft wire in proper position after it has been forced through the warp wires and the slay moved forwardly. The lever 116 is substantially L-shaped and is provided with a lateral projection 164 at its lower end, which is normally in its extreme forward position except when a wire is under the upper end of the lever 116. A cam 165 is arranged on the frame and this cam is adapted to be engaged by a roller 166 carried by a lever 167, pivoted on the shuttle box. This lever, when it engages the cam 165, moves the projection 164 rearwardly. The lever 168 is mounted on the side of the shuttle box and is provided with an offset end 169 (see Figure 9). The contact 155 is mounted on this lever and the rear end of the lever is provided with a set screw 170 adapted to be engaged by the projection 164 when the lever 116 is swung on its pivot.

Operation.

The slay is swung forwardly and rearwardly in the usual manner by means of the lever 20. In normal operation, the dog 34 is in raised position, as shown in Figure 3 of the drawings. The heddle frames 16 are reciprocated in the usual manner, and the shuttle is reciprocated in the shuttle track 6 when the shed is open to lay the warp thread. The picker sticks 78 are maintained under tension by the springs 88 when in withdrawn position and as soon as the rod 84—85 swings the arm 90 on its pivot to release the lower end of the picker stick, the spring throws the picker stick inwardly to engage the picker stick with the shuttle and throw the shuttle across the slay to the opposite shuttle box. The picker stick is then returned to its normal position by the cam 103. The engagement of the cam 103 and roller 104 moves the link 106 and the lower end of the picker stick inwardly. The spring 108′ elevates the link 106, sufficiently to permit the roller 104 to clear the cam after the picker stick has been returned. During the normal operation of the machine, the main circuit through the wires 131 and 132 is closed and the circuit from the source of current 138 is open. The coils 35 are then energized, holding the dog 34 in raised position. Upon breakage of a warp thread, the corresponding member 145 (see Figures 7 and 8) is lowered, closing the circuit through the source of current 138 and the coils 137. This immediately breaks the main circuit by the attraction of the armature 136, moving the contact 135 away from the contact 134, and deenergizes the coils 35, permitting the dog 34 to engage one of the teeth 32 upon forward movement of the slay and stop the machine. The provision of means to instantly stop the machine upon breakage of wires during the forward movement of the slay is an important feature of the present invention. The machine is stopped by disengaging the clutch 2 in the manner heretofore described. The machine may be stopped at any time by the operator through the manually operated switch formed by the contacts 147 and 142, the rod 148 being moved by the operator to stop the machine.

When the shuttle is traveling from one shuttle box to another, the slay is stationary and the main circuit is broken. When the shuttle enters the box, it engages the portion of the binder lever 160 that projects into the shuttle box, as shown in dotted lines in Figure 14 of the drawings and swings this lever on its pivot to close the contacts 158—159. This again completes the circuit to swing the slay on its pivot. If, for any reason, the shuttle should not travel the full length of the shuttle track and should stop in the warp threads, the circuit will not be completed and the machine will remain stationary until the operator remedies the trouble and replaces the shuttle in the shuttle box. As stated, the weft wire is arranged under the lever 116 when it is stretched by the stretcher. If the weft wire breaks, the lower end of this lever is raised by the lever

167 riding over the cam 165 to break the contacts 154 and 155. Thus, the machine will be stopped due to breakage of either the warp wires or weft wires or due to failure of the shuttle to travel from one shuttle box to the other. The arrangement of the control mechanism is such that only a slight amount of current is necessary and sparking is negligible. Furthermore, the machine is substantially fool proof and any breakage of the main circuit, due to any cause whatever, will deenergize the coils 35 and immediately stop the machine by disengaging the clutch.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size, and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. In a power operated loom, a swinging slay, a shuttle race-way, shuttle boxes arranged at the end of said race-way, a control circuit, a switch arranged in each shuttle box and adapted to be opened when the shuttle moves out of the shuttle box, a coil arranged on the machine and connected to said circuit, a locking member adapted to engage the slay when said coil is deenergized, a clutch controlled lever, and a rack and pinion for controlling said lever, said rack and pinion being actuated by the movement of said locking member to an inoperative position.

2. In a power operated loom, a swinging slay, a shuttle race-way, shuttle boxes arranged at the end of said race-way, a control circuit, a switch arranged in each shuttle box and adapted to be opened when the shuttle moves out of the shuttle box, a coil arranged on the machine and connected to said circuit, a locking member adapted to engage the slay when said coil is deenergized, a clutch controlled lever, a cam engaging said lever to actuate it, and means connecting said cam to said locking member to operate said cam upon movement of said locking member.

3. In a device of the character described, a shuttle box, a binder lever arranged on said shuttle box and having a portion thereof projecting into the shuttle box, said lever being adapted to be moved from its normal position by a shuttle entering said shuttle box, a contact carried by said lever, and a second contact arranged on the shuttle box and adapted to be engaged by said first contact when the lever is moved.

4. In a device of the character described, a slay, a shuttle box arranged on said slay, a pivoted lever arranged on said shuttle box, means for normally maintaining said lever in one position, one end of said lever being adapted to engage the weft wire, and a pair of contacts adapted to be maintained in closed position when the weft wire is in engagement with said pivoted lever.

5. In a device of the character described, a slay, a shuttle box arranged on said slay, a pivoted lever arranged on said shuttle box, a spring normally maintaining said lever in one position, the free end of said lever being adapted to engage a weft wire, a pair of normally closed contacts, and means for moving said lever against the tension of said spring to disengage said contacts when said lever fails to engage the weft wire.

In testimony whereof, I affix my signature.

FRANK F. SCHMIEGE.