July 9, 1940. B. COOPER 2,207,144

RECORDING DEVICE

Filed July 8, 1938 2 Sheets-Sheet 1

Fig. 1.

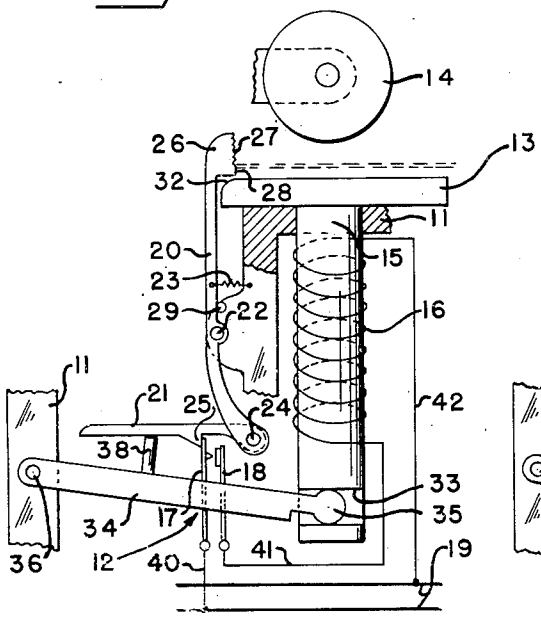


Fig. 2.

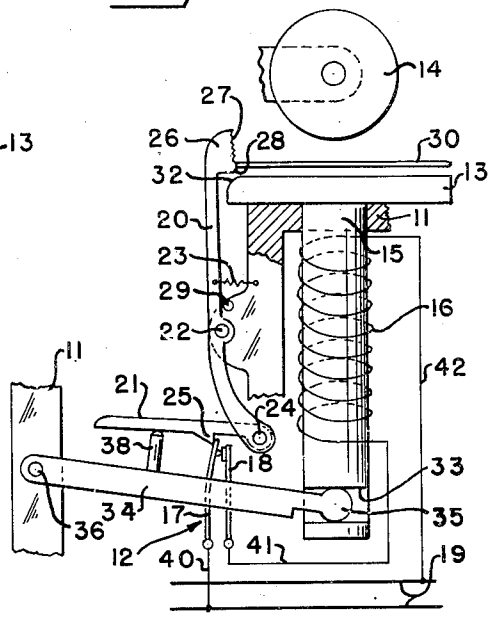


Fig. 3.

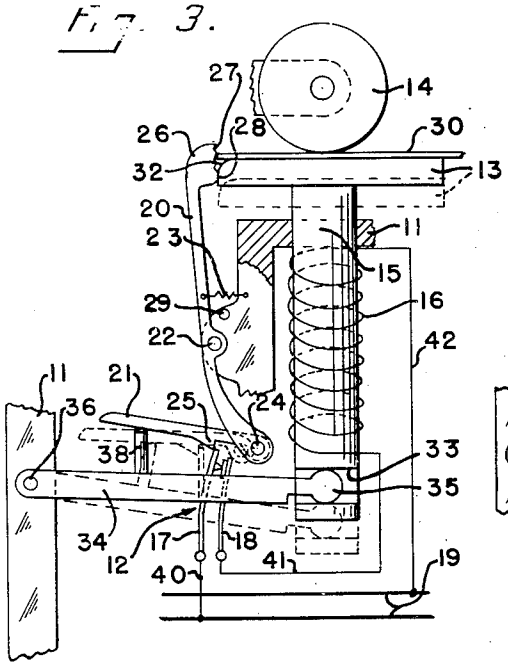
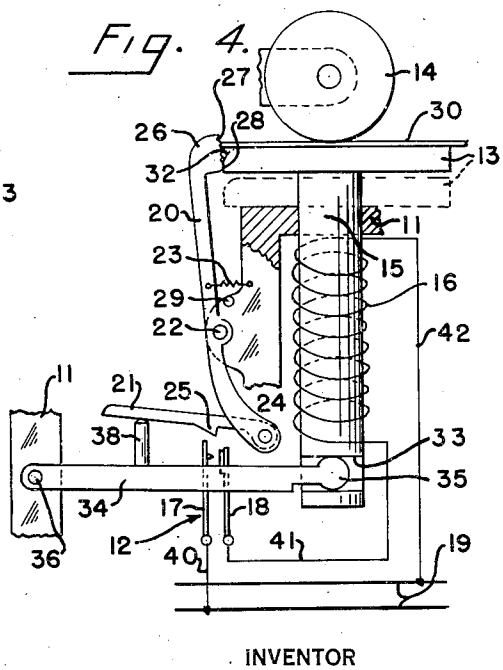


Fig. 4.



INVENTOR

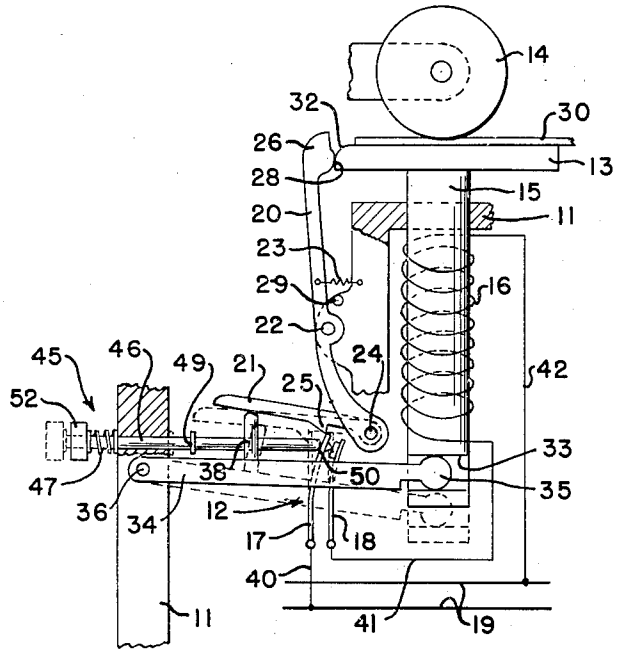
Benjamin Cooper

July 9, 1940. B. COOPER 2,207,144

RECORDING DEVICE

Filed July 8, 1938 2 Sheets-Sheet 2

Fig. 5.



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Benjamin Cooper

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UNITED STATES PATENT OFFICE

2,207,144

RECORDING DEVICE

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Application July 8, 1938, Serial No. 218,246

10 Claims. (Cl. 101—287)

This invention relates to recording devices and more particularly to electromagnetically operated recording devices for printing a record on paper or other sheet material.

In electromagnetically operated recording devices which depend upon the actuating force applied by the insertion of a piece of paper into printing position, or by manually closing a switch to actuate the switch controlling mechanism, the force is frequently inadequate to maintain the device in operative position, or is inadequately applied to obtain a clear recording. Furthermore, in such devices the legibility of the recordings usually vary with variations in the types of papers used and the manual force applied thereto.

It is therefore an object of the present invention to provide a compact and efficient recording device of the character described for automatically and rapidly stamping paper or sheet material independently of variations in the type of paper or force applied thereto.

Another object is to provide means to insure a strong legible print for each insertion of a sheet of paper or sheet of material.

Another object is to provide means to insure a strong legible print for each closure of the switch means.

A further object is to provide means to automatically break the circuit which operates the device, after the recording has occurred.

Other objects and characteristic features of the invention will appear from the following detailed description of one embodiment thereof, taken in connection with the accompanying drawings wherein identical reference numerals are applied to the same parts in the several figures, and in which

Fig. 1 is a diagrammatic view showing the normal relation of the parts of a recorder illustrating one embodiment of the invention;

Fig. 2 is a similar view showing the actuating sheet inserted in a printing position to cause actuation of the device;

Fig. 3 is a similar view showing the parts as they appear at the end of the actuated printing stroke;

Fig. 4 is a similar view showing the parts as they appear after de-energization of said electromagnetic means, and

Fig. 5 is a diagrammatic view showing the normal relation of the parts of a recorder, and in which an alternate form of actuating means is illustrated.

Referring to the drawings which illustrate one embodiment of the invention, a framework 11, supports an electromagnetic coil 16 and also forms a bearing for a plunger 15 of the electromagnetic coil 16. The plunger 15 has affixed thereto a platen 13 which normally rests on the framework 11. The platen 13 is adapted to co-act with a printing mechanism such as a type holding means 14 to effect a printing operation. The platen 13 and the type holding means 14 are relatively movable one toward the other, and in the embodiment shown the platen 13 is indicated as the movable member. Any desired style of type holding means 14 can be provided such as a type holding roller as shown. Electrical means is provided for effecting the movement of the plunger 15 and the platen 13 consisting of a source of power 19, a conductor 40, a normally open switch 12 consisting of contacts 17 and 18, a conductor 41, the electromagnetic coil 16, and a conductor 42. The electrical circuit provided for effecting movement of the platen may be traced from one side of the source of power 19, through the conductor 40, the contact springs 17 and 18, the conductor 41, the electromagnetic coil 16, through the conductor 42 and back to the other side of the source of power.

For causing the actuation of the contacts 17 and 18 of the switch 12, and for retaining the contacts in closed positions a trigger lever 20 and a latch member 21 are provided. The trigger lever 20, Fig. 1 is pivoted at 22 to the frame 11 and held in position by a light spring 23 against a fixed pin 29 on frame 11. The latch member 21 is pivotally mounted at the base of the trigger lever 20 by a pin 24 and normally rests on the contact spring 17. The latch member 21 has a projecting shoulder 25 which normally lies in contact with the outer face of the spring contact 17. The upper end of the trigger lever 20 has a projecting head portion 26 which projects slightly over the platen 13, so that it may co-act therewith when platen 13 rises during its printing stroke. The head portion 26 has a serrated face 27 which insures a gripping of the edge of any sheet material that may be inserted in the device, and the face 27 of the head 26 has a slightly protruding rounded chin 28 which is so formed that it will gradually and slidably engage the advancing edge of the platen 13 during its upward printing stroke, and also when engaged with the platen will by means of its protruding shape prevent the engagement of the serrated face with the edge of the platen.

Upon insertion of a sheet of paper or other strip 30 into the printing position between the

type holding means 14 and the platen 13, the trigger lever 20 is moved to the position shown in Fig. 2. The trigger is mounted upon its pivot in such a manner that it is substantially balanced, requiring only a slight force to cause actuation thereof. Actuation of the trigger 20 will pull the latch member 21 inwardly or to the right Fig. 2, when the trigger head 26 is pushed outwardly. A slight pull of the trigger lever 20 through its base pin 24 is sufficient to cause the latch member 21 to force the contact spring 17 to be pressed against contact spring 18, closing the circuit to the electromagnetic coil 16 which becomes energized and forces the platen 13 to start to rise as shown in dotted lines in Fig. 3. When the platen 13 starts to rise due to the actuation of the electromagnetic coil 16, an upper rounded nose 32 of the platen 13 engages in cam fashion the yieldably lower protruding chin 28 of the head 26 of the trigger lever 20 forcing said trigger to be displaced further from its normal position as shown in Fig. 3. This, in turn, causes the lower end of the trigger 20, through its base pin 24, to further displace the latch member 21 from its normal position as shown in Fig. 3. The initial displacement of the latch member 21 being sufficient to make a temporary contact between the contact springs 17 and 18, the subsequent additional displacement of the latch member 21 will insure an increased and uniform contact pressure between the contact springs 17 and 18. As shown in Fig. 3, the contact spring 17 having been forced from its original position by a very small force such as the edge of a thin paper sheet conveys, the circuit is completed as described. Because of the nature of electrical contacts to arc or burn at their point of contact, especially where the slightest gap remains, and because of high contact resistance, where slight pressure or air gaps remain, it becomes essential to insure an increased and uniform contact pressure and continued closure of said contacts during their working cycle. The outer edge of platen 13 bearing against the head 26 of the trigger 20, immediately upon energization of the electromagnetic coil 16, creates a locking of the circuit and a more intimate association of the contacts until the recording has been completed. The continued closure of the contacts 17 and 18 will set up a continuous uninterrupted circuit in the electromagnetic coil 16, this in turn causes a definite uninterrupted force upon the plunger 15.

The plunger 15 is actuated by the continued uninterrupted magnetic force of the electromagnetic coil 16, thus causing a definite uninterrupted movement of the platen 13 to a printing position as shown in Figs. 3 and 4. The printing movement of the platen 13 is entirely dependent upon the force of the electromagnetic coil 16, and does not rely on the momentum of the plunger 15 or the platen 13 which may have been originated by the initial actuation of the electromagnetic coil. The printing movement of the platen 13 carries said platen against the paper or strip 30 and carries said paper against the inked type holding member 14, causing a clean-cut impression to be made on the strip 30.

The plunger 15 has at its base a slot 33 in which a lever 34, having a ball joint 35, is set. The lever 34, being pivotally mounted at 36 to the frame 11, has an extended pin 38 mounted on its upper face so that it will coact with the under-side of the latch member 21. It will be readily understood that the upward printing stroke of the plunger 15 actuates the lever 34 and by means of the pin 38 lifts the latch 21, pushing the shoulder 25 upwardly with the latch 21. When the plunger 15 reaches the top of its printing stroke, the shoulder 25 will clear the upper edge of the contact spring 17 as shown in Fig. 4, thus allowing the contact springs 17 and 18 of the switch 12 to resume their normal position as shown in Fig. 4, opening the electrical circuit and de-energizing the electro-magnetic coil 16. The printing stroke having been completed, and the electromagnetic coil 16 de-energized, the platen 13 and plunger 15 will, by their own weight assume their normal starting positions as shown in Fig. 1. The return of plunger 15 to its normal position will likewise return the pin 38 on the lever 34 to its normal position. As the paper is withdrawn, immediately after the printing operation, latch member 21 and lever 20 will also be returned to their normal position by spring 22, as shown in Fig. 1, and the device is reset and ready for the next operation.

However, if the paper is not removed immediately after printing, lever 20 will remain in its tensioned position after platen 15 and pin 38 have dropped, to permit the latch 21 to drop. As the latch drops, shoulder 25 will fall in front of contact arm 17 in disengagement with the contact arm and further movement of the lever by the paper will not be transmitted to said arm, thus preventing a second closure of the switch and a second print. Upon withdrawal of the sheet, lever 20 will be released allowing latch 21 to slide along the incline of shoulder 25 to bring the switch actuating edge to the other side of contact 17. The device is then reset for the next stamping operation.

Referring to Fig. 5 which illustrates another embodiment of the same recording device, and is substantially identical in structure with the exception of an additional mechanical means 45 to control the initial closure of the contacts 17 and 18, and permits the initial actuation of the device. Instead of depending upon the actuation of the device by the edge of a paper inserted against a finely balanced trigger mechanism, the mechanical means 45 is used to control same. The mechanical means 45 consists of a rod 46 which is supported by the framework 11 and acts as a bearing for same, attached to its outer end is a button 52, between the button 52 and the framework 11, a spring 47 is inserted to hold the button 52 in a normally disengaged position. Midway of the rod 46, a stop shoulder 49 is secured in any suitable fashion, retaining the rod in a starting position. The inner end of the rod 46 has a rounded portion 50 to insure a minimum amount of friction but a positive engagement with the contact spring 17. It will be readily understood that the actuation of the means 45 by sufficient pressure on the button 52 will cause the rounded end 50 to engage the contact spring 17 and cause contact 17 to be pressed against contact 18, closing the circuit to the electromagnetic coil 16. The actuating circuit may be traced as described in the foregoing embodiment, being identical.

It will be clearly apparent that when the circuit is closed and the electromagnetic coil 16 becomes energized, that the initial electromagnetic force on the plunger 15, which is attached to and carries with it the platen 13, is sufficient to raise the platen to a position wherein the edge 13 engages the chin 28 of the head 26 of the trigger lever 20, and the locking of the circuit and sub-

sequent breaking of the circuit is substantially as already described in the foregoing embodiment.

The embodiments of the invention herein disclosed are merely illustrative and may be modified and departed from in many ways without departing from the spirit and scope of the invention as pointed out in and limited by the appended claims.

What is claimed is:

1. In combination, a movable element, an electromagnet for moving said element, an electrical circuit for energizing said electro-magnet, a switch in said circuit, a lever, a latch member connected to said lever and engaging said switch, said lever being adapted to be moved by a sheet of material pressed against said lever for causing the latch to close the switch for completing said circuit to energize the electromagnet and move said element, said movable element being adapted to engage said lever to maintain said switch in closed position during the movement of said element.

2. In combination, a movable element, an electromagnet for moving said element, an electrical circuit for energizing said magnet, a switch in said circuit, a lever, a latch member connected to said lever and engaging said switch, said lever being adapted to be moved by a sheet of material pressed against said lever for causing the latch to close said switch for completing said circuit to energize said electromagnet and move said element, said movable element being adapted to engage said lever to lock said circuit during the movement of the element, and means to trip said latch for releasing said switch and opening said circuit upon movement of said element a predetermined distance.

3. In a printing device, a movable platen, printing wheels, electro-magnetic means to move said platen toward said wheels, means responsive to the insertion of a sheet to be printed in printing position to energize said electro-magnetic means for moving said platen, means controlled by the movement of said platen to maintain energization of said electro-magnetic means during the movement of said platen, means controlled by said platen to de-energize said electromagnetic means after the movable platen has moved a sufficient distance to press said sheet against said printing wheels for printing on said sheet, said sheet responsive means being inoperative to further energize said electro-magnetic means until the printed sheet has been withdrawn from printing position.

4. In a device of the character described, a movable element, electro-magnetic means to move said element, a circuit for said electro-magnetic means, a switch in said circuit, a lever, means on said lever for closing said switch when said lever is pivotally moved in one direction, means on said movable element for further pivotally moving said lever in said direction as said element starts moving to increase the contact pressure of the switch, said movable element having means to hold said lever in the position to which it is moved by said movable element as said element continues moving, to maintain said increased contact pressure on said switch.

5. In a printing device, a movable element, electro-magnetic means to move said element, a pair of normally open contacts in said circuit, means responsive to the insertion of a sheet in printing position for applying pressure to one of said contacts for moving the same into engagement with said other contact for closing the circuit and energizing said electro-magnetic means, means controlled by the movement of said movable element for increasing the pressure of said first contact against the second contact, and means controlled by said movable element for maintaining said increased pressure during the movement of said element.

6. In a printing device, a movable element, electro-magnetic means to move said element, a pair of normally open contacts in said circuit, means responsive to the insertion of a sheet in printing position for applying pressure to one of said contacts for moving the same into engagement with said other contact for closing the circuit and energizing said electro-magnetic means, means controlled by the movement of said movable element for increasing the pressure of said first contact against the second contact, means controlled by said movable element for maintaining said increased pressure during the movement of said element, and means to release said first contact for opening said circuit upon movement of said element a predetermined distance.

7. In a printing machine, in combination, a movable printing element, an electric circuit including an electromagnetic means to move said element, and a switch adapted to close said circuit, means to lock said switch in circuit closing position, said last means comprising a member operatively connected to said switch, means on said movable element to hold said member in switch closing position, only upon moving said movable element from normal position by said electro-magnetic means, and means controlled by movement of said element substantially to printing position, to release said locking means.

8. In a printing device, a movable printing element, an electric circuit including electro-magnetic means to move said element, and a switch to close said circuit, means to lock said switch in circuit closing position, including means on said movable element to hold said switch in closed position, only upon movement of said movable element from normal position by said electro-magnetic means, and means controlled by movement of said printing element substantially to printing position, to release said locking means.

9. In a printing device, a movable printing element, an electric circuit including magnetic means to move said element, and a switch to close said circuit, means responsive to the insertion of a sheet in printing position for closing said switch, said means including a member adapted to be contacted by said sheet and operatively connected to said switch, means for locking said switch in circuit closing position, said last means comprising means on the movable printing element to hold said member in switch closing position, only upon movement of said movable element from normal position by said electro-magnetic means, and without moving said member during a portion of the movement of said movable element, and means controlled by movement of said element substantially to printing position, to release said locking means.

10. In a printing device, a movable printing element, an electric circuit including electro-magnetic means to move said element, and a switch for closing said circuit, a member, means on said member for closing said switch, when said member is moved in one direction, means effective upon movement of said member in said direction and closure of said switch, for further

moving said member in said direction as said element is moved by said electro-magnetic means, to increase the compact pressure of said switch, and then to hold and maintain said member in increased contact pressure position without further increase in contact pressure, as said element continues to be moved by said electro-magnetic means, and means controlled by movement of said element substantially to printing position, to open said switch.

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