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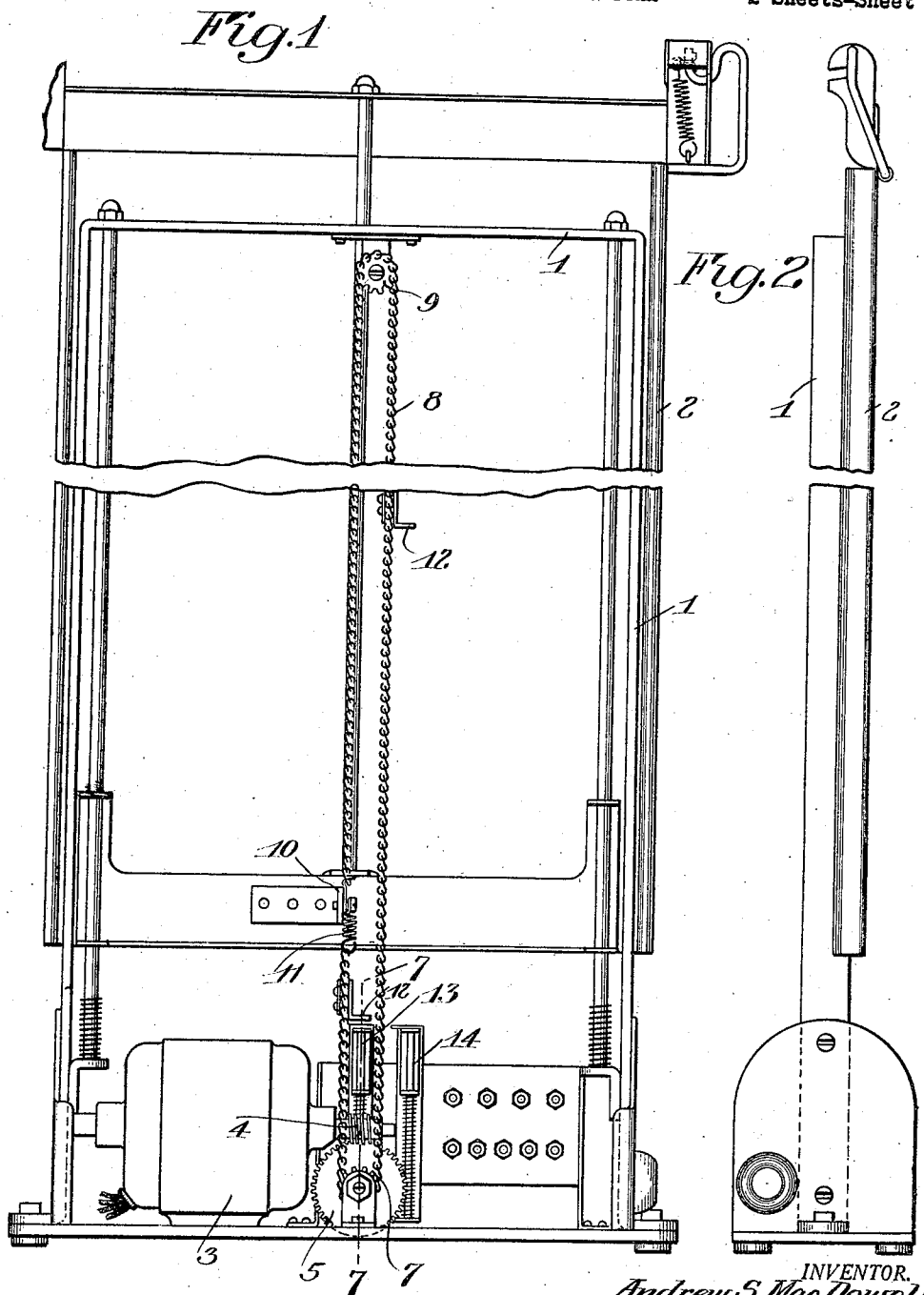
A. S. MacDOWELL

1,483,101

COPYHOLDER

Filed May 11, 1922

2 Sheets-Sheet 1



INVENTOR.
Andrew S. MacDowell

Harold E. Stenbraker
his ATTORNEY

Feb. 12, 1924.

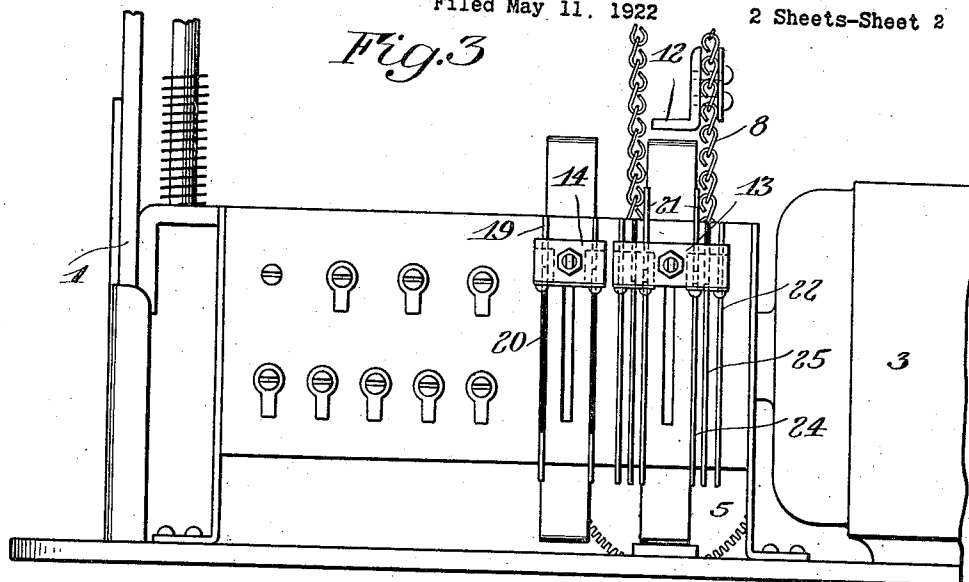
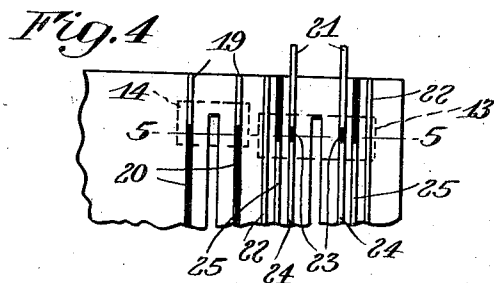
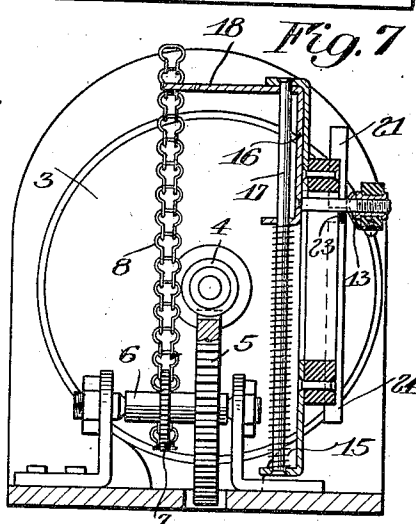
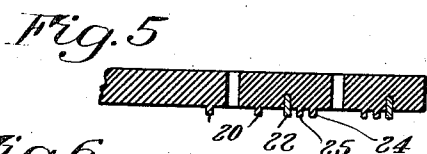
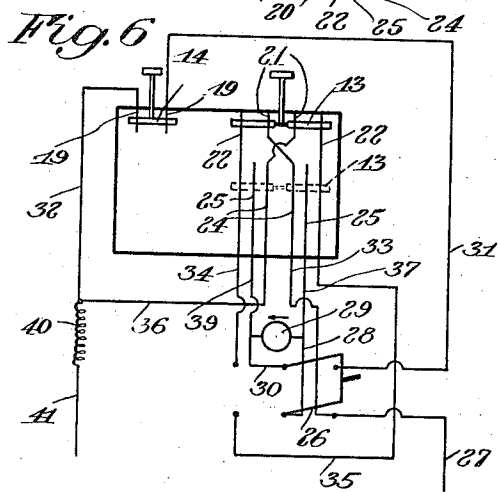
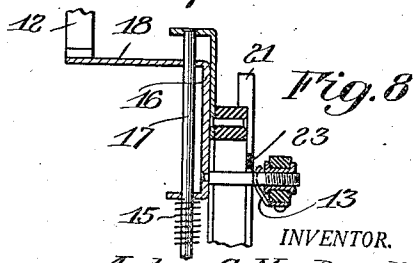
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2 Sheets-Sheet 2



INVENTOR.
Andrew S. MacDowell
BY
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UNITED STATES PATENT OFFICE.

ANDREW S. MACDOWELL, OF ROCHESTER, NEW YORK.

COPYHOLDER.

Application filed May 11, 1922. Serial No. 560,047.

To all whom it may concern:

Be it known that I, ANDREW S. MACDOWELL, a citizen of the United States of America, residing at Rochester, in the county of Monroe and State of New York, have invented certain new and useful Improvements in Copyholders, of which the following is a specification.

My invention relates to copyholders, being an improvement on the construction which forms the subject matter of my co-pending application filed March 27, 1920, Serial No. 369,431, and has for its purpose to provide a practicable and efficient electrically operated mechanism for the type of copyholder in which a copy support is movable upwardly or downwardly, supporting copy in a vertical plane, and is controlled by a reversible electric motor in such a manner as to drive the copy support positively in either direction.

A further object of the improvement is to provide simple and effective means for automatically stopping the electric motor when the copy support reaches the limit of its travel in either direction, it being understood that the motor is started to move the copy support in either direction by a manually controlled switch key.

Another object of the invention is to effectively cushion the fall of the copy support as it reaches the limit of its downward travel, and to accomplish this by automatically reversing the electric motor, thus causing it to act as a brake upon the copy support.

Still another purpose of my invention is to afford an arrangement of electric circuits and automatic controlling switches such that when the copy support reaches the limit of its downward travel, if moving at considerable speed, it automatically is reversed and travels upwardly slightly before it comes to rest.

To these and other ends the invention includes the novel combination and arrangement of parts that will appear clearly from the following description, in conjunction with the accompanying drawings, the novel features being pointed out in the claims following the specification.

In the drawings:

Figure 1 is a rear elevation, partially broken away, showing the application of a preferred embodiment of the invention;

Figure 2 is a side elevation;

Figure 3 is an enlarged front elevation of a portion of the apparatus, illustrating the automatic controlling switches;

Figure 4 is a front elevation, partially broken away, of the switch board, illustrating the circuit arrangement;

Figure 5 is a sectional view on line 5—5 of Figure 4;

Figure 6 is a diagrammatic view of the electric circuits;

Figure 7 is a sectional view on line 7—7 of Figure 1, showing a switch in normal or uppermost position, and

Figure 8 is a detail view of a portion of the structure illustrated in Figure 7, and illustrating the switch in its lowermost position.

In the illustrated embodiment, 1 designates in general a stationary frame upon which is mounted for upward and downward travel a copy support 2, the latter being operated from a reversible electric motor 3 by a suitable manual switch or switches, such for instance as illustrated in my co-pending application previously referred to, and as shown diagrammatically in Figure 6.

The motor 3 is provided with a worm 4 on its armature shaft, which engages and drives a gear 5. The gear 5 is mounted on a driven member or arbor 6, which cooperates with and actuates a flexible connection leading to the copy support. To accomplish this, there is on the arbor 6 a pinion 7 which engages a chain 8, while the latter engages a pinion 9 journaled on the frame 1, and has one end directly connected to the copy support through a lug 10 fixed thereon. The other end of the chain 8 is connected to a spring 11, which in turn is connected to the lug 10, the spring 11 functioning to take up any slack in the chain 8, and to hold the same sufficiently taut to effect a steady, accurate movement of the copy support.

It is desirable to automatically stop the

motor 3 when the copy support reaches the limit of its upward or downward travel, and to accomplish this I provide the chain 8 with abutments preferably in the form of lugs 12, which cooperate with and move alternately a pair of switches designated generally at 13 and 14, the switch 13 acting to open the motor circuit when the copy support reaches the limit of its downward travel, and the switch 14 acting to open the motor circuit when the copy support reaches the limit of its upward travel.

The switches 13 and 14 are held upwardly in normal position by means of springs 15, which cooperate with supports 16 on which the switches are mounted. The supports 16 are slidable on posts 17, and have arms or extensions 18 which lie in the path of the lugs 12, as one or the other of said lugs travels downwardly, depending upon the direction of movement of the copy support.

The switch 14 comprises a contact member that engages and slides upon a pair of tracks or strips, which include conducting portions 19 and non-conducting or insulating portions 20, so that when the switch 14 moves downwardly far enough to disengage it from the conducting portions 19, and bring it into contact with the non-conducting portions 20, the circuit is automatically opened. The switch 13 cooperates similarly with conducting tracks when the copy support reaches the limit of its downward travel, but at such time, it is also desirable to cushion the fall of the copy support, and to this end, I have provided additional means for reversing the electric motor; and thereby causing it to act as a brake against excessive downward movement of the copy support. This is accomplished by providing two sets of tracks for the switch 13 with three tracks in each set, as shown in Figures 4 and 5, the switch including two oppositely arranged conducting portions insulated from each other at the center, and each of said conducting portions acting to connect two tracks of one set. The switch is located normally at its uppermost position and in contact with conducting portions 21 and 22. As the switch travels downwardly, it comes into contact with insulated portions 23, thereby opening the motor circuit, and on further downward travel of the copy support, due to its momentum and weight, the switch is brought into engagement with conducting portions 24 and 25, thereby again closing the circuit, but in such a manner as to reverse the direction of travel of current through the armature of the motor. This action causes the copy support to commence to travel upwardly until the switch again reaches the insulated portions 23, when the circuit is again opened and the copy support comes to rest.

The circuit control will appear clearly from a consideration of Figure 6, in which 26 designates the manual control switch means for initially closing the motor circuit to operate the copy support either upwardly or downwardly. When the switch 26 is thrown to the right in Figure 6, it closes the circuit and causes the copy support to travel upwardly, current travelling through conductor 27, switch 26, conductor 28, through armature 29 in the direction of the arrow shown in Figure 6, conductor 30, switch 26, conductor 31, conductor track 19, switch 14, conductor track 19, conductor 32, motor field 40, and conductor 41. This operation continues until the copy support reaches the limit of its upward travel, when the switch 14 is moved downwardly, and the motor circuit opened at that point, thereby stopping further travel of the copy support.

When the switch 26 is thrown to the left, with reference to Figure 6, the copy support is caused to travel downwardly, current travelling through conductor 27, conductor 33, conducting track 24, conducting track 21 to switch 13, to conducting track 22, conductor 34, to switch 26, to conductor 30, through armature 29 in a direction opposite to the arrow of Figure 6, to conductor 28, switch 26, conductor 35, conducting track 22, switch 13, conducting track 21, conducting track 24, conductor 36, to motor field 40 and conductor 41. This operation continues until the switch 13 is moved downwardly by the copy support reaching its downward position, which initially opens the motor circuit and thereafter again closes the motor circuit so as to reverse the direction of travel of the motor, current then travelling through conductor 27, conductor 33, conducting track 24, to switch 13, as shown in dotted lines in Figure 6, to conducting track 25, conductor 37, through armature 29 in the direction of the arrow shown in Figure 6, to conductor 39, conducting track 25, switch 13, conducting track 24, conductor 36, motor field 40, and conductor 41. With the parts in this position, the copy support travels upwardly until the switch 13 is released and the switch 13 moves upwardly until the switch 13 reaches the insulated portions 23, again opening the motor circuit, and bringing the copy support to rest.

While I have disclosed the invention with reference to a detailed improvement, it is not limited to the precise arrangement set forth, and this application is intended to cover any modifications or departures coming within the intended purpose of the invention or scope of the following claims.

I claim:

1. The combination with a frame, of a copy support movable upwardly or downwardly thereon, a reversible driven shaft, a

flexible connection operatively associated with the driven shaft, said connection having one end directly connected to the copy support, and a spring connecting the other end of said flexible connection with the copy support whereby to take up slack in the flexible connection.

2. The combination with a frame, of a copy support movable upwardly or downwardly thereon, a driven shaft, a reversible electric motor operating the driven shaft, a flexible connection operatively associated with the driven shaft and having its ends connected to the copy support, a pair of switches controlling said motor and operating to open the motor circuit automatically when the copy support reaches the limit of its upward or downward travel, and devices carried by said flexible connection for moving said switches.

3. The combination with a frame, of a copy support movable upwardly or downwardly thereon, a driven shaft, a reversible electric motor operating the driven shaft, a flexible connection operatively associated with the driven shaft and having one end connected directly to the copy support, a spring connecting the other end of the flexible connection with the copy support whereby to take up slack in the flexible connection, a pair of switches controlling said motor and operating to automatically open the motor circuit when the copy support reaches the limit of its upward or downward travel, and devices carried by said flexible connection for operating the switches.

4. The combination with a frame, of a copy support movable upwardly or downwardly thereon, a reversible driven shaft, a pinion on the shaft, a second pinion journaled on the frame, a chain engaging the pinions and having one end directly connected to the copy support, and a spring connecting the opposite end of the chain with the copy support.

5. The combination with a frame, of a copy support movable upwardly or downwardly thereon, a driven shaft, a reversible electric motor operating said shaft, a pinion on the shaft, a second pinion journaled on the frame, a chain engaging the pinions and having its ends connected to the copy support, a pair of switches controlling the electric motor and operating to automatically open the motor circuit as the copy support reaches the limit of its upward or downward travel, and devices carried by the chain for operating the switches.

6. The combination with a frame, of a copy support movable upwardly or downwardly thereon, a driven shaft, a reversible electric motor operating the shaft, a pinion on the shaft, a second pinion journaled

on the frame, a chain engaging the pinions and having one end connected directly to the copy support, a spring connecting the other end of the chain with the copy support, a pair of switches controlling the motor and operating to automatically open the motor circuit as the copy support reaches the limit of its upward or downward travel, and lugs carried by the chain arranged to engage and move said switches as the copy support reaches the limit of its respective movements.

7. The combination with a frame, of a copy support movable upwardly or downwardly thereon, a reversible electric motor for actuating the copy support, and a switch which is operated automatically as the copy support reaches the limit of its downward travel, said switch acting initially to open the motor circuit and thereafter to reverse the direction of travel of the motor.

8. The combination with a frame, of a copy support movable upwardly or downwardly thereon, a reversible electric motor for actuating the copy support, and a switch which is operated automatically to open the motor circuit as the copy support reaches the limit of its downward travel, said switch acting automatically to reverse the motor when the copy support travels downwardly beyond the circuit opening position and to move the copy support back to circuit opening position.

9. The combination with a frame, of a copy support movable upwardly or downwardly thereon, a reversible electric motor for actuating the copy support, a driven shaft operated by the motor, a pinion on the shaft, a second pinion journaled on the frame, a chain engaging the pinions and having its ends connected to the copy support, a switch that is operated automatically as the copy support reaches the limit of its downward movement to initially open the motor circuit and thereafter reverse the motor, and a device carried by the chain for engaging and operating the switch.

10. The combination with a frame, of a copy support movable upwardly or downwardly thereon, a reversible electric motor for actuating the copy support, a motor circuit, and a switch that is automatically operated to open the motor circuit as the copy supporting member reaches the limit of its movement, the motor circuit including a plurality of conducting tracks and the switch comprising a contact member which straddles and is slidable on said tracks.

11. The combination with a frame, of a copy support movable upwardly or downwardly thereon, a reversible electric motor for actuating the copy support, a motor circuit, and a switch that is automatically operated to open the motor circuit as the

copy supporting member reaches the limit of its movement, the motor circuit including a plurality of tracks with conducting portions at the top which cause current to travel so as to drive the motor in one direction, insulated portions beneath said conducting portions, and conducting portions under the insulated portions causing current to travel so as to drive the motor in the opposite direction, the switch comprising a contact member that straddles and is slidable upon said tracks. 10

In witness whereof, I have hereunto signed my name.

ANDREW S. MACDOWELL.