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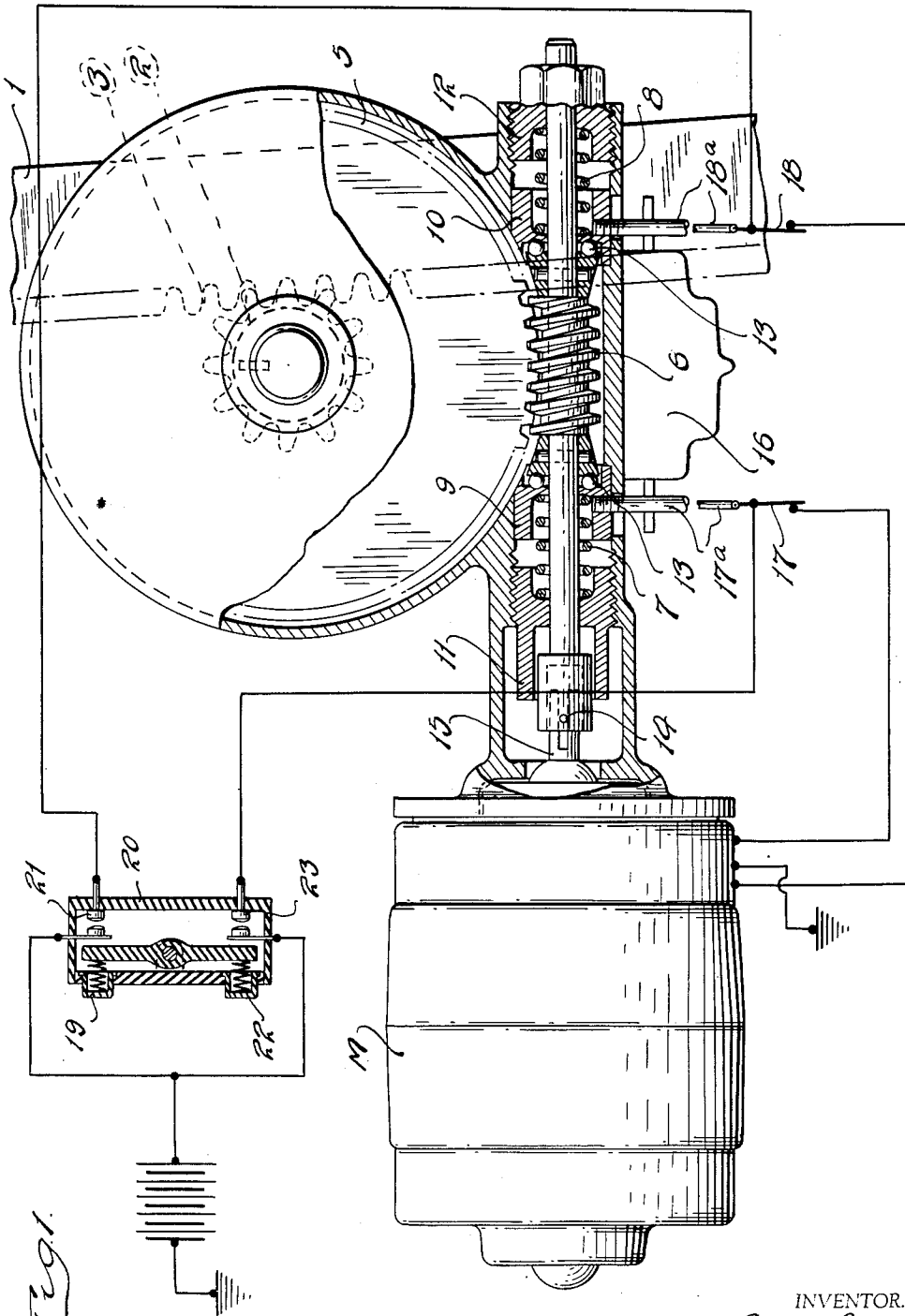
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WINDOW REGULATOR

Filed July 26, 1941

2 Sheets-Sheet 1



INVENTOR.

EMORY GLENN SIMPSON.

BY
Barnes, Kisselle, Laughlin & Faisch
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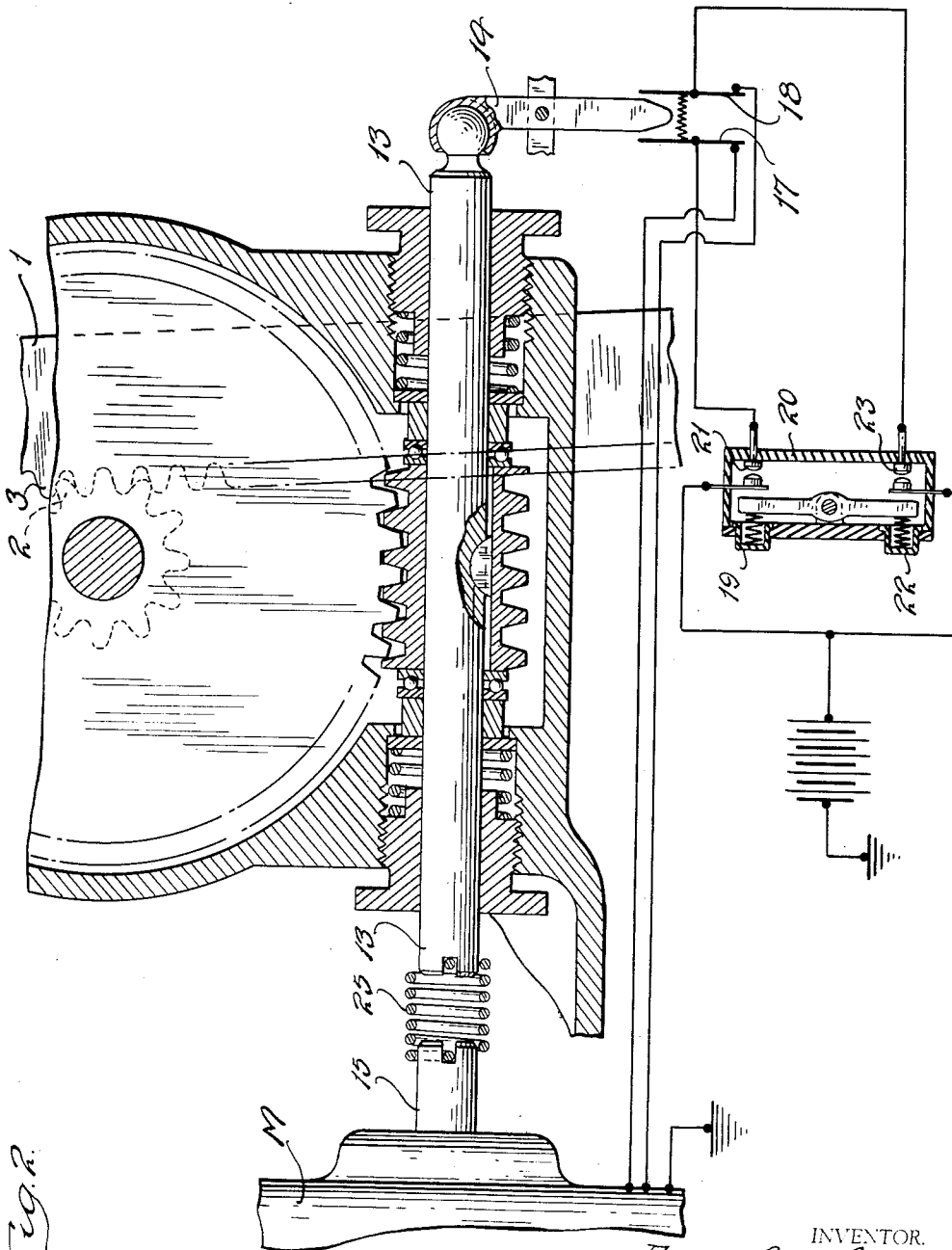
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UNITED STATES PATENT OFFICE

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WINDOW REGULATOR

Emory Glenn Simpson, Detroit, Mich., assignor
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troit, Mich., a corporation of Michigan

Application July 26, 1941, Serial No. 404,123

1 Claim. (Cl. 268—124)

This invention relates to electrically operated window regulators. With the present day wide torpedo models it is very difficult for the driver of a car to reach the crank of the right hand window regulator to adjust the right hand door window, consequently power operated window regulators are now being proposed. These are not new.

The present invention involves an electrically driven window regulator which is provided with an automatic current cut-off for the motor when the mechanism meets unusual resistance. It has previously been proposed to operate window regulators with an electric motor and to provide limit switches which are tripped when the window reaches the uppermost limit of its travel and the lowermost limit of its travel. Limit switches result in trouble and expense in installation in mass production and are also unreliable because they have to be accurately placed in connection with each window panel in order to achieve their object. The present invention not only does away with this trouble, but in case the window jams by reason of cocking in the window guides, or otherwise, the current will not continue to pass through the motor and overheat the same and possibly burn or injure the windings.

In the drawings:

Fig. 1 is a view of one form of the invention.

Fig. 2 is a view of another form of the invention.

1 is the window lifting arm which meshes with the pinion 2 by reason of the rack teeth 3. Pinion 2 is fastened to the large worm gear 5 which is driven by worm 6. This affords the necessary reduction of speed between the motor and the lifting arm 1. Springs 7 and 8, bearing against the thrust collars 9 and 10, ordinarily keep the worm 6 in a centralized position. The pressure of these springs may be adjusted by adjusting the nuts 11 and 12. The thrust collars have thrust bearings 13 between the collar and the end of the worm. The worm shaft has a pin and slot connection 14 with the armature shaft 15, hence the work shaft may move longitudinally as well as turn.

16 is a switch box. The switches 17 and 18 are shown diagrammatically in this figure and would be contained within the switch box 16. The switch 17 can be controlled by the switch arm 17a and the switch 18 by the switch arm 18a. 20 is the switch box for the control switch of the regulator. If button 19 is pressed the switch is closed through contacts 21. If button 22 is pressed, the circuit through contacts 23 is closed. These circuits cause the motor M to rotate in

one direction or the other to raise or lower the window.

When the window reaches the limit of its travel or becomes stalled by cramping in the window guides or for any other reason, gear 5 ceases to rotate, the worm 6 will operate in the gear teeth or gear 5 on the screw principle and travel longitudinally tripping either switch 17 or 18 depending upon the direction of its travel and thereby stopping the motor. When the control switch button is operated to cause the window to travel in the opposite direction, the worm will be returned to its central position.

In Fig. 2 a slightly different form of the invention is shown. Here the switches are located at the end of the worm shaft 13 and are operated by a lever 14. The motor armature shaft 15 has a flexible coupling 25 with the worm shaft 13. This has two purposes, one is, it cushions the motor against the sudden shock when overloaded, the other purpose is to permit the worm gear assembly, including the case, to tilt slightly if it is necessary to make this assembly tilt in order to give it a proper driving relation with some of the elements of the window lifting mechanism.

What I claim is:

In an electrically operated window regulator, the combination of window lifting mechanism, a worm gear for operating the same, a housing therefor, a worm engaging the worm gear, a shaft for the worm slidable and rotatable in said housing, a pair of nuts threaded into said housing and rotatably and slidably supporting said shaft, one at each end of the shaft, collars slidable in said housing, one engaging around the shaft at each end of the worm, a thrust bearing between each collar and each end of the worm, a spring between each nut and each collar, a switch arm connected to move with the shaft and worm when they move longitudinally, motor switches arranged to be operated when the switch arm moves, an electric motor having a shaft, a coiled spring connecting the end of the shaft with the end of the worm shaft to relieve the motor from shock when the window lifting mechanism is overloaded and to permit some misalignment of the two shafts, the said nuts being adjusted to put stress upon the said springs to ordinarily hold the worm in central position but when the lifting mechanism becomes overloaded or stopped said springs allowing the worm to travel on the worm gear teeth and move the switch arm to open one of said switches and thereby stop the motor.

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