(No Model.) 2 Sheets—Sheet 1.

R. C. SMITH.

CONTROLLING DEVICE FOR MOTORS.

No. 459,189. Patented Sept. 8, 1891.

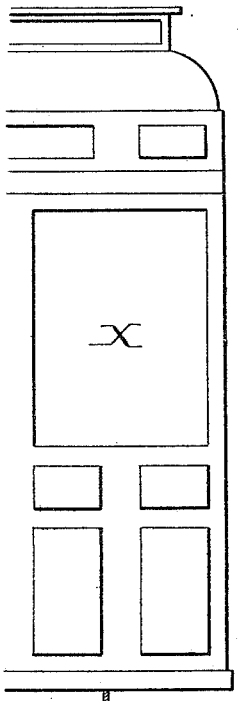


Fig. 2.

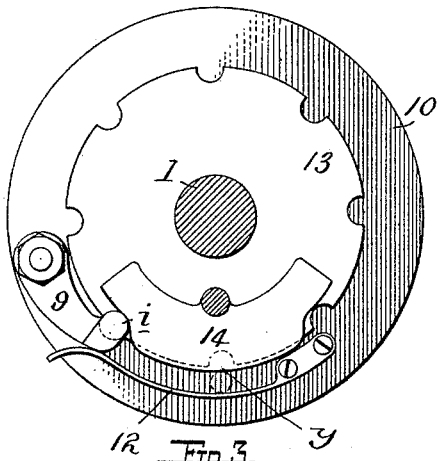


Fig. 4.

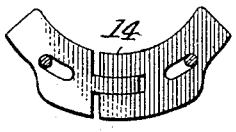


Fig. 3.

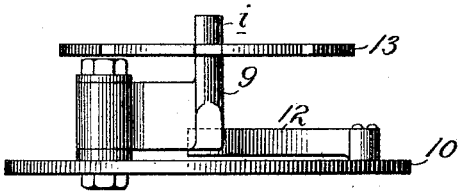
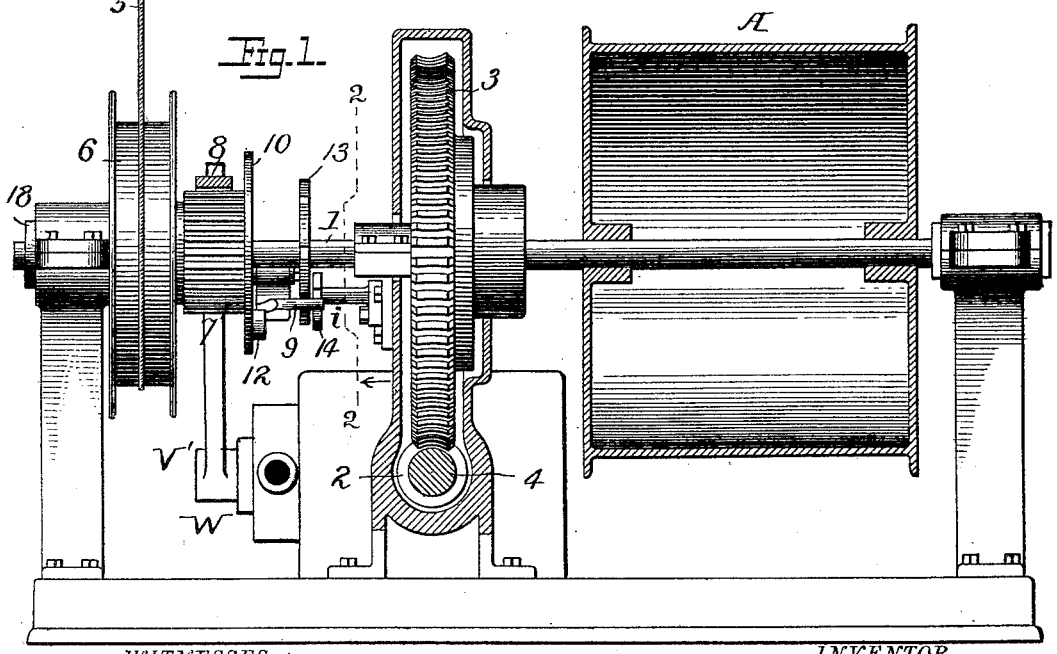


Fig. 1.



WITNESSES

Jno. J. Hinkel

H. S. McArthur

INVENTOR

Rudolph C. Smith

By Foster & Freeman

Attorneys

(No Model.) 2 Sheets—Sheet 2.

R. C. SMITH.

CONTROLLING DEVICE FOR MOTORS.

No. 459,189. Patented Sept. 8, 1891.

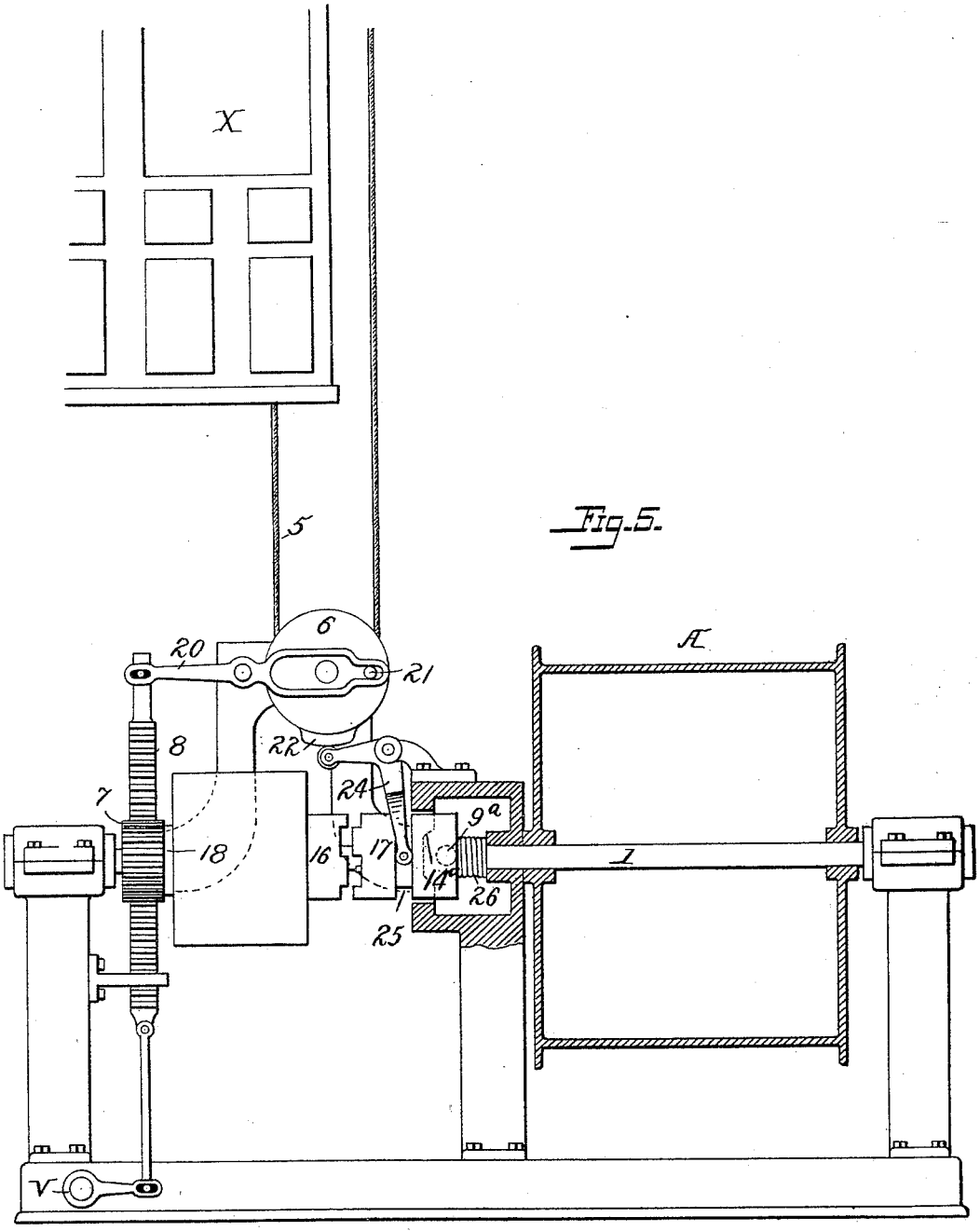


Fig. 5.

WITNESSES

Jno. G. Hinkel

H. S. McArthur

INVENTOR

Rudolph C. Smith

By Wm. A. Freeman

Attorney's

UNITED STATES PATENT OFFICE.

RUDOLPH C. SMITH, OF YONKERS, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE NATIONAL COMPANY, OF ILLINOIS.

CONTROLLING DEVICE FOR MOTORS.

SPECIFICATION forming part of Letters Patent No. 459,189, dated September 8, 1891.

Application filed December 15, 1890. Serial No. 374,796. (No model.)

To all whom it may concern:

Be it known that I, RUDOLPH C. SMITH, a citizen of the United States, residing in Yonkers, Westchester county, State of New York, have invented certain new and useful Improvements in Controlling Devices for Motors, of which the following is a specification.

In many classes of engines, as in elevator-engines, for instance, or others in which it is frequently necessary to start the engine from a state of rest, the amount of power required to overcome the inertia of the parts in starting is greater than is needed for maintaining the operation of the engine, so that it is necessary to throttle or in some other way reduce the flow or energy of the motor-fluid after the engine has started or else to permit the latter to operate at an undesirable speed. In other cases it is necessary to start with a low pressure and increase the pressure after a proper speed is acquired.

My invention consists in means whereby after the controlling device for the engine has been operated by the engineer to furnish the proper power to the engine to start the same the power is subsequently automatically varied to the desired extent by automatically moving the controlling device of the engine.

In order that those skilled in the art may understand my invention, I have described the principles thereof and illustrated embodiment of the same in the accompanying drawings, in which—

Figure 1 is a sectional elevation of sufficient of an elevator-engine to illustrate my improvements in connection therewith. Fig. 2 is an enlarged sectional elevation on the line 2 2, Fig. 1, looking in the direction of the arrow. Fig. 3 is a plan view of the parts shown in Fig. 2. Fig. 4 is a detached view of the cam as modified. Fig. 5 is a sectional elevation showing my invention embodied in a different construction.

I have shown my invention as applied to an elevator, and in the drawings W represents an engine of any suitable character—as, for instance, an electric motor or a steam or hydraulic engine—which is connected to the hoisting-drum A by suitable connections, as the worm-wheel 3, mounted on the shaft 1 of the drum, and the worm 2, mounted on the shaft 3, connected with the engine.

Some suitable controlling device for starting, stopping, and reversing the engine is provided, which may be operated from the cage, and in the present instance I have shown a hand-rope 5, extending from the cage X to the lower hand-rope wheel 6, which is mounted on a sleeve 18 in line with the drum-shaft 1 and which carries a pinion 7, which gears with a rack 8, connected in any suitable manner with the valve, switch, or other stopping and starting device V′ of an engine. These parts need not be more fully described, as they are common and well known, and are here represented only to illustrate one application of my invention.

The means for automatically varying the controlling device of the engine may be variously constructed; but in Sheet 1 of the drawings I have illustrated one means adapted to operate the controlling device of the engine automatically to restrict the power of the engine or throttle it after it has been started under an excessive flow of motor-fluid or other power; and it consists in a clutch-section or contact-piece in the form of a pawl 9, pivotally mounted on a carrier, shown as a disk 10, secured to the pinion 7 or other movable part of the engine-controlling device. The pawl is pressed inward by a spring 12 toward the edge of a notched disk 13, which forms the other clutch-section or contact-piece, and which is connected in any suitable manner with the shaft of the drum or other driven shaft of the engine, so as to turn therewith. Normally the end of the pawl engages one of the notches of the disk 13, so that any revolution of the shaft 1 would carry with it the pawl and the pinion 7 and connected parts; but there is arranged adjacent to the disk 13 a cam-plate 14, connected to any suitable fixed support—as, for instance, to the frame of the machine—which cam-plate is so arranged and so constructed as to lift the end or finger *i* of the pawl out of the notch or away from the edge of the disk whenever the pawl makes contact with said cam, moving in either direction.

As a result of the construction above set forth the revolution of the pinion 7 by the

act of the operator shifts the valve or other controlling device to its full extent, so that the maximum energy of the motor-fluid is brought into action to start the engine. Normally the point of the pawl occupies a mid-position at *y* upon the cam, so that the shifting of the starting device in either direction to start the engine carries said pawl beyond the end of the plate and into one of the notches of the then stationary disk 13. As soon as the engine begines to move, after its inertia is overcome by the action of the motor-fluid, the disk 13 travels with the part to which it is attached and carries the pawl with it toward the end of the cam-plate 14, upon which the finger *i* of the pawl rides until said finger is lifted from the notch in the disk, when the latter and the engine will continue their movements without imparting any further motion to the pawl. As a result of the movement of the pawl imparted by the action of the notched disk the parts connected with the pawl, together with the valve or other controlling device, are carried back to a limited extent from the extreme position in which they were put by the operator, so that while the motor-fluid is still permitted to act it is so throttled or restricted as to avoid the application of the entire or maximum force to the engine, except during the short interval between the first shifting of the valve by the operator and its readjustment automatically by the machine. It will be evident that the extent of movement thus automatically imparted may be varied by varying the length of the cam 14, substituting longer for shorter plates, or vice versa, or by the use of a plate in two sections capable of adjustment, as shown in Fig. 4.

As an illustration of a different form of means for automatically varying the controlling devices of the engine, reference is made to Fig. 5, in which the parts corresponding to those in Figs. 1 to 4 are designated by the same letters and numerals. In this construction to lock the shafts 1 and 18 together the shaft 18, carrying the pinion 7, and the rack 8, connected with the valve V, is shifted by a lever 20, slotted to receive a stud 21 upon the lower hand-rope pulley 6. Upon said pulley is a cam 22, engaging one end of the bell-crank lever 24, forked and with studs entering the groove 25 of the section 17 of the clutch, which section slides upon the shaft 1, but turns therewith, being thrown in one direction by a spring 26. A lateral pin 9^a projects from the hub of the clutch-section 17 over the edge of the stationary cam 14^a. When the parts are at rest they are in the position shown in Fig. 5; but when the hand-rope is pulled in either direction it turns the pulley 6 and shifts the valve V, and after the valve is fully thrown the cam 22 moves away from the lever 24, so that the spring 26 then throws in the clutch-section. As the engine receives and then continues the movement imparted upon opening the valve, the clutch-section 17 will be turned with the shaft 1 and will turn the pinion 7 and connected parts until the valve is partially closed to the extent required for the proper continued movements of the machine, when the pin 9^a will ride up one of the inclines of the cam 14^a and the section 17 will thereupon be disengaged from the section 16, so that no further movement will be imparted to the valve automatically.

While I have described my invention in connection with elevator apparatus, I have done so wholly for purposes of illustration, and do not confine myself to this application, as the same may be employed in connection with engines for operating the rudders of vessels, the turrets of war-vessels, and many other purposes.

While I have described two clutch-sections or contact-pieces operating together, one of the sections being connected to move with the valve and the other being connected to move with the engine, and have shown the same in certain definite forms, I do not limit myself to these special forms, as it is evident that these devices may be varied and other equivalent devices substituted therefor producing substantially the same mode of operation and results.

Without limiting myself to the precise construction and arrangement of parts shown, I claim—

1. The combination, with an engine, a controlling device therefor, and means for manually shifting said controlling device, of means operated by the engine for automatically shifting or reversing the controlling device to regulate the amount of power desired to be applied, substantially as described.

2. The combination, with an engine, a controlling device therefor, and means for operating said controlling device by hand, of means adapted to be operated upon starting the engine to automatically shift or reverse the controlling device, whereby the power of the engine is reduced or varied, substantially as described.

3. The combination, with an engine and controlling device therefor and with means for operating said controlling device by hand, of means for automatically shifting or reversing the controlling device by the movements of the engine, the said means consisting of a contact device connected with the controlling device of the engine and a contact device engaging therewith and carried by a movable part of the engine, said means arranged to operate the controlling device as soon as the engine is started, substantially as described.

4. The combination, with an engine and controlling device therefor, of means for automatically shifting or reversing the controlling device to regulate the amount of power, the said means consisting of two contact-pieces, one connected to the controlling device and the other connected to the engine, and connections between the contact-pieces, arranged upon starting the engine to tempora-

rily connect the pieces and shift the valve-controlling mechanism, substantially as described.

5. The combination of an engine, a controlling device therefor, the contact-piece connected with said controlling device, a contact-piece connected with the engine, and an intermediate disengaging device for the contact-pieces for disengaging them after the controlling device has been partly shifted from its extreme position on the starting of the engine, substantially as set forth.

6. The combination of an engine, a controlling device therefor, a contact-piece connected with the controlling device, a second contact-piece connected to move with the engine, and a cam arranged to shift one of the contact-pieces upon the starting of the engine, substantially as described.

7. The combination of an engine, a controlling device therefor, contact-pieces arranged between the engine and controlling device, and an adjustable cam for disconnecting the contact-pieces upon the starting of the engine, substantially as described.

8. The combination of an engine, a contact-piece in the form of a notched disk connected to turn therewith, a controlling device for the engine, a pawl connected to move therewith and arranged to engage the disk, and a cam arranged to lift the pawl from the disk when moving from an extreme position in either direction, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RUDOLPH C. SMITH.

Witnesses:

F. L. FREEMAN,

J. S. BARKER.