

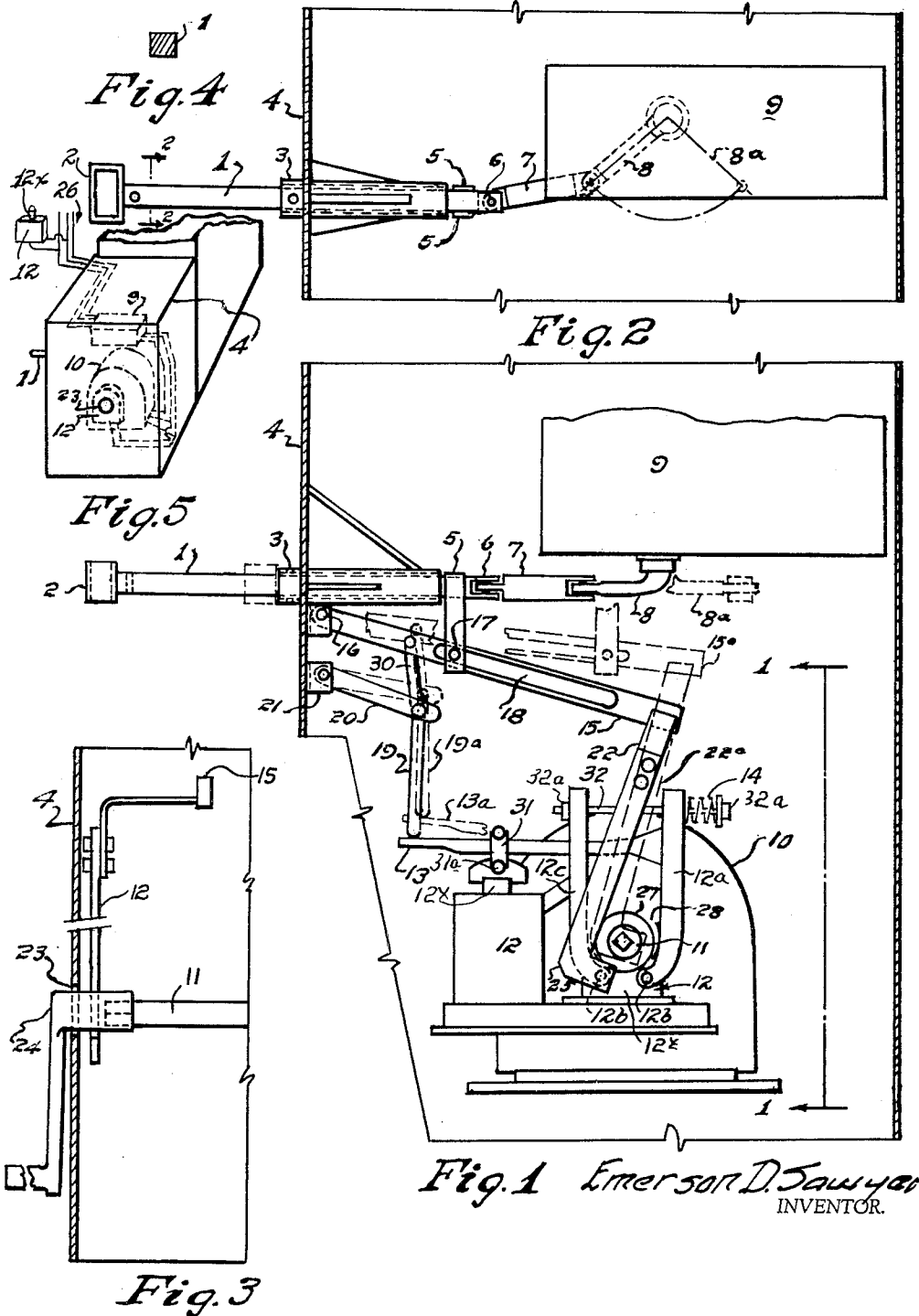
May 16, 1961

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SAFE MEANS FOR INTERCHANGING HAND
OPERATION FOR MOTOR OPERATION

2,984,123

2 Sheets-Sheet 1



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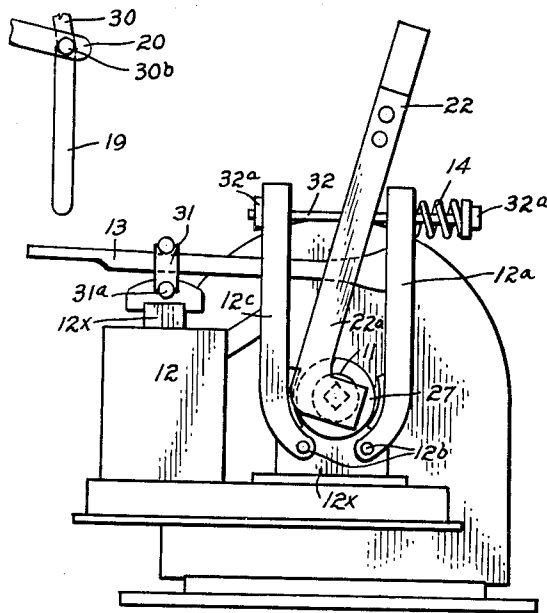


Fig. 6.

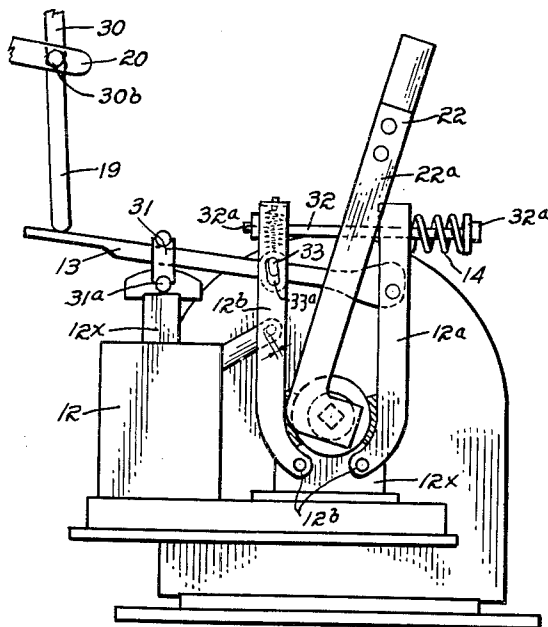


Fig. 7

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1

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SAFE MEANS FOR INTERCHANGING HAND OPERATION FOR MOTOR OPERATION

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3 Claims. (Cl. 74—625)

My invention relates to certain novel improvements in a safe means for interchanging hand operation for motor operation. The invention also includes a means of returning to remotely controlled motor operation from hand operation by means of the same mechanism in reverse operation.

The motor is utilized to raise and lower a barrier device over a roadway on a bridge. Barriers, especially yieldable type devices, as are placed on bascule or lift spans which must resist heavy impact loads are liable to become disarranged during the night or at a time when nobody is available on the bridge except a single operator. This operator may be an electrician or a mechanic, but generally he is neither of these. Hence it is logical that the mechanism which controls the transition from a motor-driven device to a hand-operating device should be incorporated in the barrier mechanism as a whole so as to insure that the road service and the protection to the road vehicles using the bridge should not be interrupted by any delay in the operator's functioning or deliberations in changing from a mechanically operated mechanism to a hand operated mechanism, especially when a barrier device must be moved up from its lowered position to a position above the roadway.

Prior constructions required for this change from machine operation to hand operation are cumbersome as the housing enclosing the mechanism has to be removed switches pulled independently, and a solenoid-operated, or other brake for the barrier raising and lowering motor released independently. Such operations are time consuming and also a source of danger to the operator unless carried out in the proper sequence. However, with the present improvement the movement of these pieces of mechanism is taken care of through one single operation automatically by movement of a single member which is operatively connected thereto.

It is therefore an object of my invention to provide a safe, foolproof and positive means for changing from electrical operation to hand operation of a barrier or other device.

Another object of my invention is to provide a safe, foolproof and positive means for changing from hand operation to electrical operation of a barrier or other device.

Another object of my invention is to provide a means enabling a bridge operator to readily raise or lower a yielding barrier network by hand, safely and without delay and without placing himself in physical danger due to some remote control device functioning accidentally or otherwise.

A further object of my invention is to provide a means whereby a hand crank can not be utilized until the electrical operation is terminated.

The barrier mechanism shown herein which is applicable for use on other machines is best described in the drawing accompanying this application, in which:

Fig. 1 is a fragmentary vertical sectional view through a portion of the mechanism housing located near the

2

base of a barrier column and showing the contained mechanism in elevation;

Fig. 2 is a fragmentary horizontal section through the mechanism housing of Fig. 1 showing a motor circuit cutout switch and its operating means, the subjacent motor and related elements being deleted for the sake of clarity;

Fig. 3 is a fragmentary view taken on line 1—1 of Fig. 1, showing the hand crank inserted onto the motor shaft extension;

Fig. 4 is a section of the outside of the square operating shaft taken on the line 2—2 of Fig. 2;

Fig. 5 is a general perspective of the mechanism housing used on a barrier column.

Fig. 6 is an elevational view of the motor and showing the solenoid-controlled brake disengaged, as when the motor is running and the solenoid is energized; and

Fig. 7 is a similar view showing the brake in operation with the motor stopped and the solenoid de-energized under push button control.

Referring to the drawing in detail, the numeral 1 designates a square operating shaft. The shaft 1 is fitted with a handle 2 and is mounted to side in a guide tube 3 which is supported in a housing 4 and projects laterally therefrom. Toward the inner end of shaft 1 and within the housing 4 is secured a depending U-shaped frame 5. A swing bar 7 is pivotally connected at one of its ends to the inner end of the shaft 1 by a swivel pin 6 and is secured at its other end to the cut-out switch lever 8 which controls the electrical switch 9. The cutout switch 9 is the electrical switch required between the power lines 26 (Fig. 5) in the barrier supporting structure and the barrier-raising and lowering motor 10 inside the housing 4 of the barrier supporting structure.

The movement of switch lever 8 to its "in" position 8a, and the reverse movement to its full line position (see Figs. 1 and 2) actuates the switch 9 so that the motor 10 is either in circuit or out of circuit with the power supply lines 26.

The operating push and pull shaft 1 is the means for electrically connecting the remote controlled power lines 26 to the motor 10 through the cutout switch 9. Thus, when shaft 1 and switch lever 8 are in the "out" or full line positions of Fig. 1, the motor 10 is out of circuit with power lines 26 so that it can be operated manually, as will be presently explained. But when shaft 1 has been pushed in to disposed switch lever 8 in the dotted position of Fig. 1, motor 10 is in circuit with power lines for remote control actuation in reverse directions by the bridge attendant as will be described later on herein.

The armature shaft 11 of the motor 10 is provided with a conventional brake which is controlled by the fixedly supported solenoid 12. This brake comprises opposed jaws 12, 12c at opposite sides of said armature shaft 11, said jaws having their intumed brake shoe-carrying lower ends pivoted as at 12b to a fixed mount 12x which is disposed below said armature shaft 11.

An elongated rod 32 having stops 32a at each end extends freely through opposed holes in the upper ends of said brake jaws; and there is a strong coil spring 14 interposed between one of said stops 32a and the opposed face of the adjacent jaw 12a. This is so as to normally maintain the brake jaws 12, 12c swung inwardly to cause the jaw-carried brake shoes to frictionally engage opposite peripheral portions of the brake wheel 27 which is fast on armature shaft 11.

Relative outward shift of the brake jaws 12a, 12c disengage the jaw-carried brake shoes from the armature shaft-carried brake wheel 27 and is effected as usual by lever 13 when the motor is started.

This lever 13 has its inner end connected to brake jaw 12a and extends through a hole in the companion brake

3

jaw 12c, the outer portion of lever 13 having a pivotal connection 31, 31a with the normally outwardly projected core 12x of the fixedly supported solenoid 12. The solenoid 12, as usual, is in circuit with motor 10 so that when that circuit is closed and the motor 10 is running, the solenoid will be energized and its core 12x will be drawn inwardly from its normal Fig. 7 position to that of Fig. 6. This means that the resultant downward movement of lever 13 will spread the brake jaws 12a, 12c to disengage the jaw-carried shoes from the armature shaft-carried brake disk 27. In this connection, it is to be noted that there is a conventional interengaging cam and slot means 33, 33a provided by lever 13 and jaw 12c to effect outward swinging of the jaw 12c.

Referring to Fig. 1, the full line position of push and pull shaft 1 and switch control lever 8 means, as previously explained, that the circuit through power lines 26 (Fig. 5) to the motor 10 and brake-releasing solenoid 12 is broken at switch 9 (Figs. 1 and 5).

On the other hand, as also indicated earlier herein, when shaft 1 and switch lever 8 are in the dotted line position of Fig. 1, the circuit from power lines 26 to motor 10 and solenoid 12 is closed, except for the usual normally open push button type switches (not shown) which form no part of the present invention but are operable in the usual way to operate the motor 10 in reverse directions for moving a bridge roadway barrier (not shown) up or down.

But still referring to Fig. 1, it is to be noted that when the circuit 26 to the motor 10 and brake-releasing solenoid 12 is broken at switch 9, the lever 13 and solenoid core 12x have been depressed by mechanical means to actuate the brake jaws to inoperative position shown in Fig. 6 when the motor is running and solenoid 12 is energized.

The above referred to mechanical brake jaw (12a, 12c) releasing means shown in Fig. 1 and fragmentarily in Figs. 6 and 7, is availed of to enable the armature shaft 11 of the out of circuit motor 10 to be safely turned by hand to elevate or lower a bridge roadway barrier, and such mechanical means will now be described.

In carrying out the mechanical brake jaw releasing phase of the invention, and referring to Fig. 1, I provide the depending U-form bracket 5 of the push and pull shaft 1 with a cross pin 17 which works in the closed longitudinal slot 16 of the subjacent and elongated main lever 15 whose inner end is pivoted as at 16 to the wall of housing 4 below the sleeve 3. A depending link 30 is pivoted as at 30a to the main lever 15 inwardly of the inner end of its slot 18 and the lower end of link 30 is pivoted as at 30b to the outer end of a short lever 20. The inner end of the short lever 20 is pivoted (21) to a housing wall-carried bracket. Depending from pivot 30b is an actuating bar 19, the lower end of which is aligned with the free end portion of the solenoid-actuated brake jaw release lever 13.

When shaft 1 is pushed in to its switch (9) closing and motor running dotted line position of Fig. 1, it will be evident that the pin and slot connection 16, 18 between the shaft (1) carried bracket 5 and main lever 15 will cause the latter and lever 20 along with 30, 19, to assume the dotted line positions indicated. This means, of course, that the lower end of bar 19 will be sufficiently elevated as not to prevent the brake jaw control lever 13 from assuming its brake jaw (12a, 12c) releasing position shown in Fig. 7 and in dotted lines in Fig. 1.

Referring to Figs. 1 and 5, it will be noted that the outer end of the slotted main lever 15 fixedly carries an L-form member 22 having its broad depending long arm 22a adjacent the frontal wall of housing 4, so that the lower end of the latter will overlie the lower wall opening 23 (see Fig. 5) which is aligned with the squared end of the motor armature shaft 11 except when switch 9 is open (see full lines of shaft 1 and switch lever in Fig. 1). But when switch 9 is open as stated and parts 1, 8, 16, 30, 20 and 19 are in the full line position of Fig. 1,

4

it is noted that main lever 15 has actuated the depending arm 22c of the L-form member out of line with the armature shaft 11 (see Fig. 1) and consequently out of line with the housing wall opening 23 of Fig. 5. This means that the socketed end of crank 27 can be engaged with the squared end of armature shaft 11 to operate the motor by hand to raise or lower a bridge roadway barrier (not shown).

It will be understood that the Fig. 7 illustration shows the motor stopped, the solenoid 12 deenergized and the brake jaws 12a, 12c in operative position as when switch 9 is closed and the motor is available for operation by normally open push button switches (not shown).

In operation, the operator of the barrier must come to the barrier column base where the mechanism housing is located with a hand crank in his possession. This is all the equipment he needs when he leaves the bridge tower to go to the base of the column to change the barrier over to hand operation. His first logical physical function normally would consist of placing the hand crank 24 on the extension of the motor drive shaft 11. This he cannot do without first pulling out the square operating shaft 1 on the outside face of the housing 4. Pulling shaft 1 outwardly actuates three devices simultaneously, first it removes the connection of the power lines 26 so that the motor can not be started electrically, second, it unlocks the solenoid brake so that the motor shaft 11 can be turned by hand, and third, it functions the guard 22 which opens a hole 23 through the housing 4 which permits the bridge operator to safely insert his hand crank in order to raise or lower the barrier.

After the mechanism inside the housing has been made to move through the required distance by means of the hand crank 24, then by removal of the hand crank the operator is able to reset the mechanism for electrical operation. This function is simply performed by the operator pushing in on the operating shaft 1. By pushing the shaft 1, "in," the switch 9 is moved so that the motor can be functioned by remote control, the solenoid brake 12 is reset and allowed to grasp the wheel 27 attached to the motor shaft, and the hole 23 is blocked off so that the crank 24 cannot be inserted onto the end of the drive shaft 11. All of these functions are performed by movement of shaft 1 which in turn moves the U-shaped frame 5. The connecting link members movable by U-shaped frame 5 including slide bar frame 15, links 20, 30, 19 and frame 13 function to operate the solenoid brake jaws 12a; the lever 8 carried by shaft 1 and link 7 controls the cutout switch 9; and the guard 22 carried by the bar frame 15 controls access to the opening 23 in the housing 4.

The combination of a cutout switch and guard for the hole where the hand crank is attached to the motor shaft is several years old.

I am fully aware that there are a number of ways that the cam construction shown and described can be used in a different form to function the parts to which it is connected, therefore while I have illustrated and described the preferred form of construction for carrying out my invention, these are capable of variation and modification without departing from the spirit of the invention. I do not wish to be limited to the precise details disclosed, but desire to avail myself of such variations and modifications as fall within the scope of the appended claims.

I claim:

1. In apparatus of the class described including an electric motor having an armature shaft, an energizing circuit for said motor and having a circuit making and breaking switch, a housing in which said motor is enclosed, said motor having one end of its armature shaft directed toward one wall of said housing, said housing wall having an opening aligned with said armature shaft and the latter having a crank-engaging portion at its end, and a closure for said opening movable to and from

5

operative position; the improvement which comprises a manually operable member operatively connected to said circuit making and breaking switch whereby to move the same to circuit making and breaking position, link-incorporating means connected to and operated by said manually operated member, a connection between said link incorporating means and said closure and being operable to move the closure clear of said opening when said manually operable member is moved to a position in which said circuit making and breaking switch is in circuit breaking position.

2. The structure of claim 1 and said link-incorporating means pivotally connected to said housing.

3. In apparatus of the class described including an electric motor having an armature shaft, there being a housing enclosing said motor and providing a wall opening aligned with an end of the armature shaft of said motor, the said armature shaft end having crank socket engageable means, and a shiftable closure for said housing wall opening, an energizing circuit for said motor and having a circuit making and breaking switch, said circuit incorporating a solenoid magnet therein having a core which is drawn thereinto when said magnet is energized, spring actuated brake means acting through the armature shaft of the motor to resist turning of said armature shaft when the motor circuit is open, there being a brake releasing member carried by said solenoid core and connected to said brake means for moving the latter to inoperative position when the solenoid is energized and its core drawn inwardly; the improvement which comprises a manually operable

6

member operatively connected to said circuit making and breaking switch whereby to move same to circuit opening and closing position, link incorporating means connected to and operated by said manually operated member, and said link-incorporating means movable to engage and actuate said brake-releasing member to brake releasing position when said manually operated member is moved to shift said switch to circuit opening position, and a closure operator incorporated in said link means and connected to said closure, said closure operator movable to shift said closure in a direction to clear said wall opening for insertion of a crank there-through and onto said armature shaft end when said manually operable member is moved to actuate said switch to circuit breaking position.

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