This invention relates to power units for rolling doors, and the like, and in particular relates to such a unit wherein emergency operation is possible even with the electric drive motor removed.

Large rolling doors or curtains of the type utilized for closing wall openings, and in similar situations, usually have a power operator in the form of an electric motor. This makes the opening and closing of the door or curtain rapid and simple. It follows, however, that emergency operation of the door or curtain must be provided so that in the event of a power failure, or failure of the electric motor, the door or curtain can still be operated.

Hence, emergency operators of this nature have usually been located at one end of the motor with the motor being connected with the door or curtain at the other end. With such an arrangement, the door or curtain becomes inoperative when the motor is removed and it is necessary to replace the motor before the mechanism can again be operated. According to the present invention, this drawback in connection with conventional rolling door or curtain operators is eliminated.

A particular object of the present invention is the provision of a rolling door operator in which emergency operation is possible at all times, either with or without the motor in place.

Another object of this invention is the provision of an operator for rolling doors or curtains of the nature referred to in which the power unit is adjustable into a plurality of positions relative to the door.

A still further object is the provision of a rolling door operator in which a substantially conventional electric motor can be employed rather than the special motors generally used.

Still another object of this invention is the provision of a combined power and manual operator for a rolling door in which actuation of the manual operator prevents operation of the power operator.

These and other objects and advantages will become more apparent upon reference to the accompanying drawings in which:

Figure 1 is a fragmentary elevational view looking at a rolling door curtain from the inside showing a power unit associated therewith according to the present invention.

Figure 2 is an elevational view looking in from the right side of Figure 1.

Figure 3 is a vertical sectional view through the operator indicated by line 3—3 on Figure 1.

Figure 4 is a transverse sectional view indicated by line 4—4 on Figure 3.

Figure 5 is a sectional view indicated by line 5—5 on Figure 3 showing a brake pertaining to the mechanism, and

Figure 6 is a vertical sectional view through a brake shifting lever as indicated by line 6—6 on Figure 4.

Referring to the drawings more in detail, as will be seen in Figures 1 and 2, there is a wall 10 having an opening 12 and a slatted curtain or door 14 arranged to slide in guides 16 at the edges of the door opening so that the opening can be closed or opened. Door or curtain 14 is adapted for being rolled up on a drum 18 located within a hood 20 carried on cast end brackets 25 that are attached to wall 18 above the opening. The brackets provide the support for the drum and curtain.

For the purpose of power operating drum 18 the supporting shaft 22 of the drum carries a sprocket 24 connected by a chain 26 with a sprocket 28 that forms a part of power unit generally indicated at 30 and constructed according to the present invention.

The power unit 30 comprises an electric motor 32 which drives through a transmission contained within a housing 34 into a shaft 36 on which sprocket 28 is mounted. Motor 32 is reversible so that the drum 18 can be power operated in both directions. The usual electric current is associated for reversibly energizing motor 32 and the limits of travel thereof are determined by a screw type limit switch 38 of a conventional type which includes a sprocket driven by a chain 40 that passes over a second sprocket 42 on shaft 28.

Referring now to Figure 3, motor 32 has an output shaft 44 to which is attached a collar 46 carrying pins 48 on which are sidable clutch shoes 50 normally urged inwardly by annular springs 52. The clutch shoes 50 carry frictional facings 54 and the shoes are adapted for moving radially outwardly on pins 48 at a predetermined motor speed thereby to bring friction facings 54 into frictional driving engagement with a clutch drum 56. Drum 56 is connected by key 58 with a shaft 60 which is supported on anti-friction bearings 62 and 64 in a housing member 66. Between the bearings shaft 60 has attached thereto or formed thereon a worm 68 that meshes with a worm wheel 70 keyed to the previously mentioned shaft 36 on which sprockets 28 and 42 are mounted.

A clutch drum 56 has extending radially outwardly therefrom a braking flange 72 which on one side is adapted for engagement by the frictional element 74 mounted on a brake shoe 76 that is spring urged upwardly by compression springs 78 which will best be seen in Figure 5. Pins 79 inside springs 78 guide the brake shoe vertically and support it against side thrust. In order to move the brake shoe away from the brake flange when motor 32 is energized, there is a solenoid 80 connected in circuit with the motor so as to be energized simultaneously therewith and operable through its armature for pulling upwardly on a link 82 which is pivoted to an arm 84 that will draw the brake shoe downwardly when the left end of the arm is moved upwardly.

Reference to Figures 4 and 6 will show that arm 84 is pivoted at 86 to the spaced arms 88 of a fitting 90 that is attached to a housing part 92 that is bolted to housing member 66. Housing part 92 encloses the clutch and brake and has a cover plate 94 forming a support for motor 32, the said motor being attached to the support by cap screws 96.

The aforementioned arm 84 is formed in two parts, there being a channel shaped portion 98 that is connected with link 82 and pivoted to the arms 88 and within which there is a bar 100 having a nose 102 that engages an abutment screw 104 in brake member 76 while at the opposite end of bar 100 there is an abutment screw 106 in portion 98 for adjustment of the bar about the pivot 86 so that a relatively small amount of movement of link 82 will move the brake member away from brake flange 72.

The brake flange is also availalbe of for indicating over-load on the motor, and this is accomplished by positioning a thermostat 108 in position to be influenced by the temperature of brake flange 72 and which temperature is an indication of the temperature of the clutch drum. When-
ever more than a predetermined amount of slippage occurs between the drum and the clutch shoes the drum will heat up and this heat will be transmitted to the thermostat operating the thermostat and interrupting the energizing circuit to the motor.

According to the present invention, the housing part 92 comprises an upstanding central portion 110 on which is rotatably supported a sprocket 112. Slidable on the hub of sprocket 112 is a member 114 which is interlocked with the sprocket by cast keys or ribs. The clutch member 114 is of the jaw type and has projections 116 adapted for engaging apertures 118 formed in the bottom of the clutch drum 56.

The clutch member 114 can be moved upwardly to cause the projections 116 to enter the apertures 118 thereby drivingly to connect clutch drum 56 with sprocket 112 by operation of a lever 120 which is attached to a shaft 122 and which has pins 125 extending into an annular groove 126 about the periphery of the clutch member. Shaft 120 has a lever 124 connected thereto outside housing part 92 and a chain, or the like, 126 is attached to the lever so that it can be operated thereby to raise the clutch member when so desired.

A spring 128 within the housing part continuously biases lever 120 in a direction to hold clutch member 114 downwardly and the projection 130 on which the spring is attached is also available for operating limit switch 132 whenever the clutch member is raised so that energization of electric motor 32 is prevented except when the clutch member is in its disengaged position.

Lever 120 may also comprise an adjustment screw 134 that limits the movement of the lever in its direction to engage the clutch member.

Lever 120 also has a projection 136 thereon extending into an aperture 138 in member 76 so that rotation of the lever in a direction to engage the clutch member will also cause disengagement of the brake member from the brake flange.

With the jaw clutch engaged with the clutch drum and the brake member disengaged and energization of motor 32 prevented by rotation of lever 120 via manually operated lever 124, the shaft 60 can be rotated by chain 140 which passes through conduits 142 and about sprocket 112.

It will be seen from this drive arrangement that the electric motor 32 is not only of a more or less conventional type, having only a single shaft extension, but that means for the provision of the pad brake with the motor removed from the unit as it is with the motor in place on the unit. Thus, failure of the motor which would require removal thereof does not interfere with the manual operation of the mechanism in any way whatsoever.

A further feature of the arrangement of the present invention is its flexibility in that it can be mounted in any of a plurality of different positions. For example, the housing member 66 is closed at its opposite sides by caps 150 which are retained in place by cap screws 152. The cap screws can be removed and the entire unit rotated about the axis of shaft 36 to any of four different positions without affecting the drive to the drum of the rolling door. Similarly, for mounting of the unit at the opposite end of the door, the shaft 36 and worm wheel 70 mounted thereon can be reversed so that the said shaft projects from the other side of the unit.

It will be necessary the member comprising the conduits 142 or chain guide can also be detached and turned into any of four positions 90° apart so that the emergency chain will always extend downwardly.

The supporting of the unit according to the present invention on the cast end brackets 25 is accomplished by a bracket 154 that is attached to feet 156 of caps 150 by bolts 160 with there being an adjusting screw 160 provided for maintaining the drive chain 26 properly tensioned.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions and accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

I claim:

1. In an operator for a rolling door, said rolling door having a shaft rotate for actuating the integral transmission unit drivingly connected with said shaft, said transmission unit comprising a clutch drum at the end thereof opposite said shaft, a reversible electric motor detachably mounted on said transmission unit on one side of the clutch drum and having an output shaft extending into said clutch drum on the axis thereof, the clutch members on said output shaft normally disengaged from said drum but operable in response to a predetermined speed of rotation of the output shaft for moving radially outwardly to drivingly connect the motor output shaft with the drum, a manual actuator in the transmission unit on the other side of the drum for actuating the said drum and normally disengaged therefrom, manual means for moving said actuator into engagement with the drum, means for manually driving the actuator, and switch means responsive to engagement of the said actuator with the drum for preventing energization of the drum and normally disengaged therefrom, means for engaging the actuator with the drum and for manually driving the actuator, and switch means responsive to engagement of the said actuator with the drum for preventing energization of said electric motor, said clutch drum comprising a brake flange, a brake member normally engaging said brake flange, means responsive to energization of the electric motor for disengaging said brake flange, and means responsive to the engagement of said actuator engaging said brake flange, means for driving the gearing, a second housing attached to the first housing and having an open end said intermediate shaft extending into the second housing and a clutch drum attached to the end thereof in said second housing, an electric motor detachably mounted on the second housing and having shaft means extending into the clutch drum, clutch shoes mounted on the shaft means for radial movement thereon into driving engagement with the clutch drum at a predetermined speed of said motor, a brake flange on the clutch drum, a brake shoe in the second housing spring urged into engagement with said brake flange, solenoid means connected in circuit with said motor operable to move the brake shoe away from said brake flange upon energization of said motor, a sprocket rotatably supported in said second housing about said intermediate shaft, a jaw clutch member drivingly connected with the hub of the sprocket and axially movable, an operating lever in the second housing movable for engaging the
jaw clutch member with the clutch drum while simultaneously disengaging the brake shoe from the brake flange, a switch in circuit with the electric motor, means on said lever for operating the switch to prevent energization of the motor when the jaw clutch member is engaged with the clutch drum, and a chain engaging said sprocket and leading from the second housing for manual actuation of the intermediate shaft independently of the electric motor.

4. In a power and manual operator for rolling doors and the like; a first housing, an output shaft projecting from said first housing, a drive train within the first housing leading to the output shaft at one end, a second housing attached to the first housing having an open end, a cylindrical clutch drum in the second housing opening outwardly of the open end of the second housing, said clutch drum being connected to the drive train at the end thereof opposite the output shaft, an electric motor having clutch means thereon receivable within said clutch drum, means detachably mounting the electric motor on the open end of said second housing, manual means for actuating said transmission interposed between the clutch drum and the said output shaft, said manual means being normally disengaged and being operable when engaged to prevent energization of said electric motor, the arrangement being such that the electric motor can be removed from said second housing without interfering with any part of the said drive train including the said manual means.

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