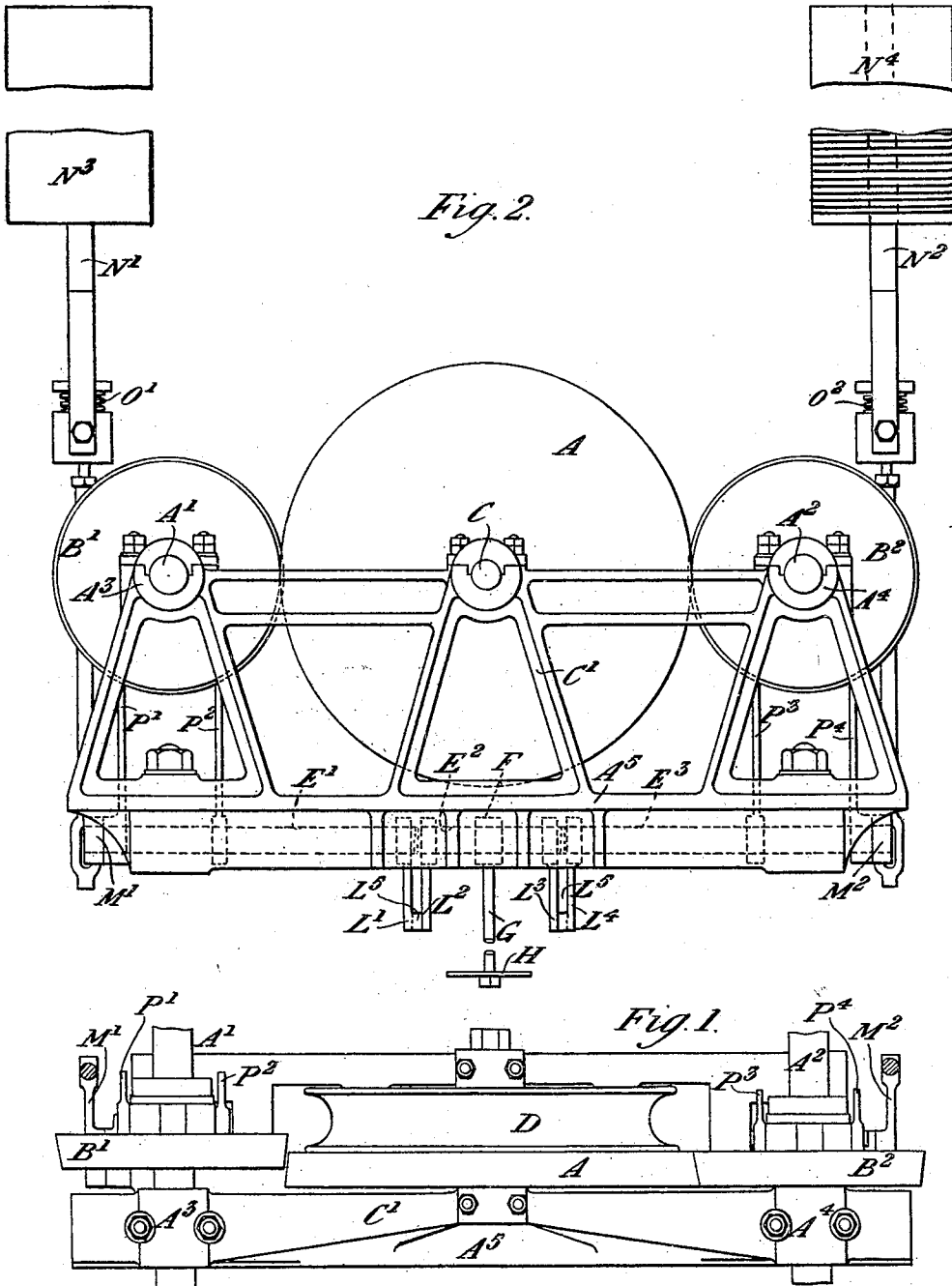


F. W. SCOTT.
SCENE SHIFTING APPARATUS.
APPLICATION FILED APR. 19, 1909.

979,209.

Patented Dec. 20, 1910.

4 SHEETS-SHEET 1.



Witnesses:
[Signature]
[Signature]

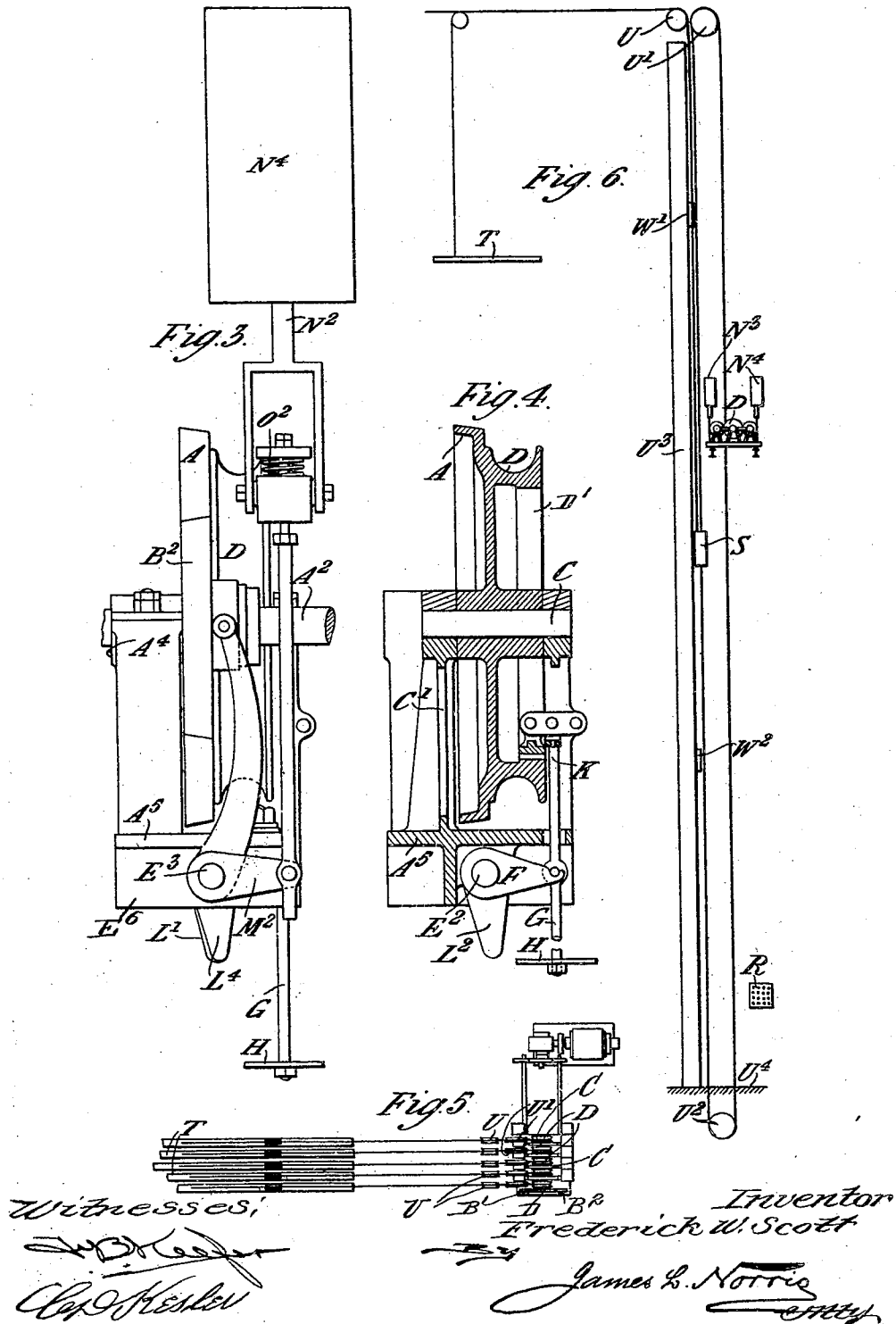
Inventor
Frederick W. Scott
By *[Signature]*
James L. Norris

979,209.

F. W. SCOTT.
SCENE SHIFTING APPARATUS.
APPLICATION FILED APR. 19, 1909.

Patented Dec. 20, 1910.

4 SHEETS-SHEET 2.

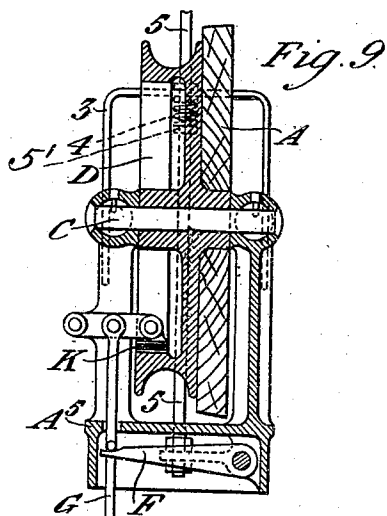
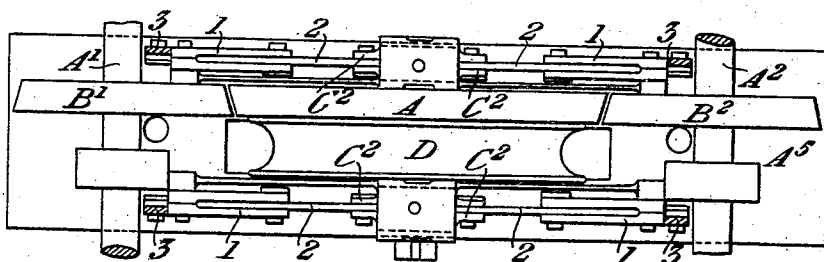
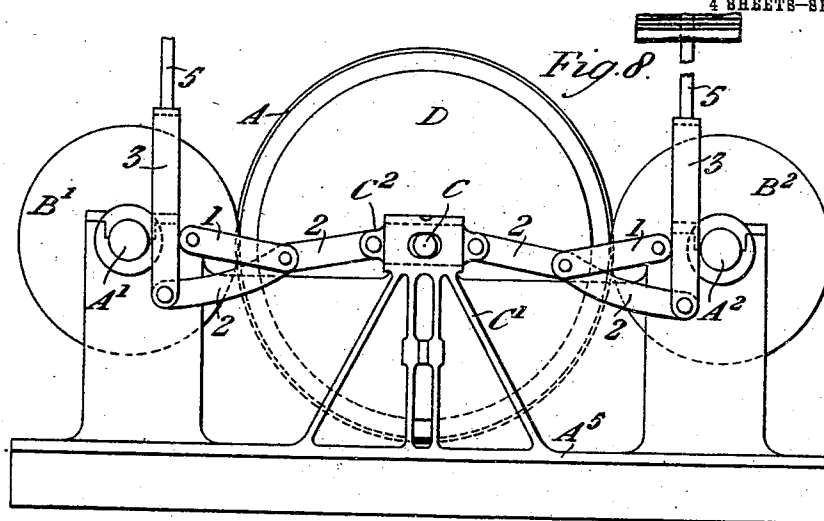


979,209.

F. W. SCOTT.
SCENE SHIFTING APPARATUS.
APPLICATION FILED APR. 19, 1909.

Patented Dec. 20, 1910.

4 SHEETS—SHEET 3.



Witnesses,

[Signature]
[Signature]

Inventor

Frederick W. Scott

[Signature]
James L. Norris

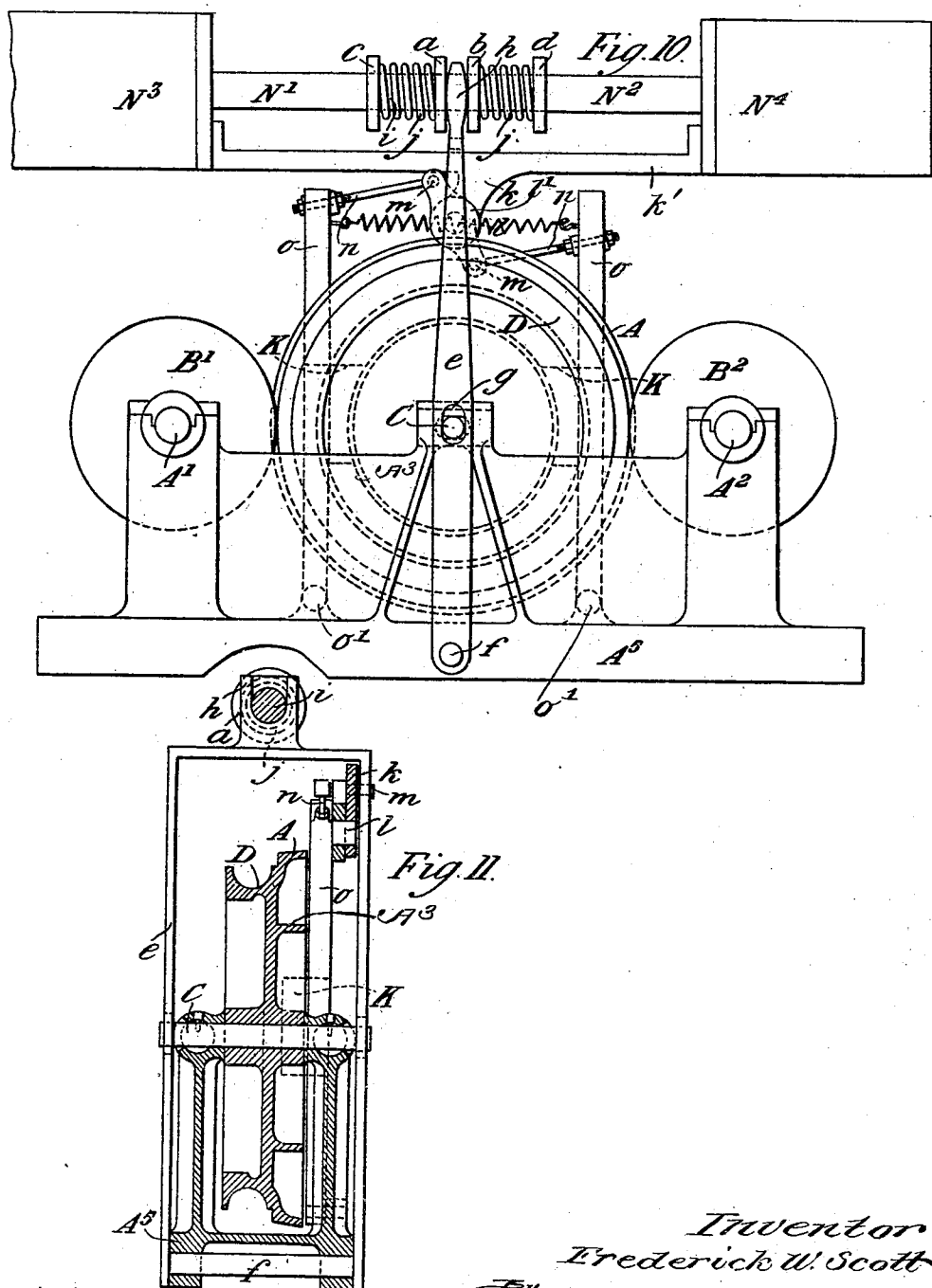
[Signature]

F. W. SCOTT.
SCENE SHIFTING APPARATUS.
APPLICATION FILED APR. 19, 1909.

979,209.

Patented Dec. 20, 1910.

4 SHEETS-SHEET 4.



Witnesses
F. B. Keady
Chas. S. Foster

Inventor
Frederick W. Scott
 By *James L. Norris*
att'y.

UNITED STATES PATENT OFFICE.

FREDERICK WILLIAM SCOTT, OF LONDON, ENGLAND.

SCENE-SHIFTING APPARATUS.

979,209.

Specification of Letters Patent.

Patented Dec. 20, 1910.

Application filed April 19, 1909. Serial No. 490,814.

To all whom it may concern:

Be it known that I, FREDERICK WILLIAM SCOTT, a subject of the King of Great Britain, residing at 122 Cannon street, in the city of London, England, consulting engineer, have invented certain new and useful Improvements in Scene-Shifting Apparatus, of which the following is a specification.

This invention relates to mechanism for raising and lowering curtains, scenery, and the like in theaters and other places, and consists in an improved apparatus which is distinguished from other apparatus of the class by the provision of two separate shafts, one for hoisting and the other for lowering, which are geared to the driving motor so as to be rotated in opposite directions. By clutching the hoisting drums of the various scenes or cloths with one or other of these shafts scenes may not only be raised and lowered simultaneously but the lowering is as positively controlled and regular as the raising, which is not the case when the scenes are lowered gravitationally under brake control. Besides enabling different cloths to be lowered at the same rate and in definite relation with each other, the method of shifting above referred to which characterizes this invention enables the various scenes or cloths to be counter-balanced, thereby reducing the power required for raising them.

In the apparatus hereinafter described provision is made for applying a brake to the hoisting pulley of each cloth simultaneously with its disengagement from the raising or lowering shaft, so as to prevent over-run and hold the cloth at the required elevation, but it is to be understood that such a device is not broadly new in apparatus of this character any more than the electric driving of such apparatus or the use of electromagnetically actuated clutches for connecting the hoisting pulleys with the driving shaft, and the present applicant makes no broad claim to such devices as part of his invention.

In the improved apparatus, the hoisting drum or pulley may be frictionally clutched to either driving shaft either by bringing a pulley or cone slidable on the shaft into engagement with a friction pulley or cone fixed on the hoisting pulley, or by moving the latter cone into engagement with either of the driving cones which would be fixed

on their shafts, in both cases the small movement necessary being effected by means of a solenoid or other electromagnet the movement of the armature of which when energized causes the clutch members to engage, thereby starting the hoisting pulley. Adjustable limit switches may be provided which are operated by a tappet or by the balancing weight on the hoisting rope or other suitable moving part of the hoisting gear to break the circuit of the energized solenoid or electromagnet when the scene has been raised or lowered to a predetermined position.

The clutch solenoids may be controlled directly by manually operated switches in their circuits, or they may be connected and disconnected from the supply circuit by means of switches controlled by small pilot solenoids the current to which is controlled by push buttons or other suitable switches. Preferably each scene would have three pushes, one controlling the hoisting clutch solenoid, another the lowering solenoid, and the third a release or cut-off switch. The scenes are hoisted and lowered preferably by an endless rope fixed at one point to the counter-balancing weight and passing over upper and lower guide pulleys and around the hoisting pulley.

The invention is illustrated in the accompanying drawings in which—

Figures 1, 2 and 3 are respectively a plan, end elevation and side elevation of a portion of the apparatus showing the driving shafts and hoisting pulley; Fig. 4 is a section through the hoisting pulley; Fig. 5 is a plan showing a number of top battens of a series of scenes with attached counter-weights and with hoisting ropes passing over hoisting pulleys; Fig. 6 is an elevation showing the top batten of a scene with the hoisting ropes or chains and counter-weights attached; Figs. 7, 8, 9 are a plan, an elevation and a section of a modification of what is shown in Figs. 1, 2 and 4; and Figs. 10 and 11 are an elevation and section of another modification.

Referring first to Figs. 1-4, wherein the friction cones on the driving shafts are slidable thereon and adapted to be shifted so as to engage the cone on the hoisting pulley, the two shafts A_1 , A_2 are driven by a suitable electric motor in opposite directions through suitable reducing gear. These shafts are furnished with cones B_1 , B_2 sliding on

feathers in the shafts; each shaft having one cone for each scene to be lifted. These shafts run in bearings A_2, A_1 arranged at each end of a base plate A_5 placed at right angles to the shafts. Centrally between these bearings and on the same base plate are two pedestals C' which carry a short shaft or axle C on which runs a pulley D suitably grooved and furnished with a friction cone A and brake path D' . The friction cone A is of such dimensions that should either of the cones on the shafts be moved slightly forward, the cones will come into close contact and the rope pulley will revolve, but as soon as the driving cone is moved backward the connection ceases and the rope pulley is brought quickly to rest through the brake coming on. To obtain this result it is necessary that the act of moving either cone forward should release the brake, but directly the driving and rope pulley cones cease to be in contact the brake must automatically come into action. For this purpose three shafts E_1, E_2, E_3 are arranged their axes in alignment below the base plate A_5 , and running in bearings E_6 cast on the baseplate. The center shaft E_2 carries a hooked or forked lever F which when the shaft moves through a small angle, catches a rod G carrying a weight H which holds the brake K in action, and lifting it up releases the brake. This shaft also carries at each end a lever L_2, L_3 furnished with a lip L_5 . Similar levers L_1, L_4 are placed at the corresponding ends of the two outer shafts, and so arranged that should either shaft E_1 or E_3 be so revolved as to bring the cone into action the lips on the levers will engage and the center shaft will revolve through a similar angle, causing the hooked lever F to lift the weight and release the brake. On the cones disengaging, the outer shaft will turn back so that the lips of the levers will cease to be in contact and the weight falling will cause the brake to come into action.

The motions of the shafts E_1, E_3 are transferred respectively to the sliding cones B_1, B_2 through the pairs of arms P_1, P_2 and P_3, P_4 . To obtain the necessary movement for the shafts E_1, E_3 and the sliding cones a lever M_1, M_2 is keyed on each of the two outer shafts. These levers respectively are connected to the cores N_1, N_2 of the two solenoids N_3, N_4 through springs O_1, O_2 and so arranged that on a current being passed through either solenoid the corresponding spring is compressed thereby lifting one or other of the levers M_1, M_2 and causing the corresponding shaft to move through such an angle as will insure the driving cone being moved forward by the levers P_1, P_2 or P_3, P_4 keyed to the shafts E_1 and E_3 sufficiently to have a strong frictional contact with the rope pulley cone.

The scenes are each counterbalanced by a

weight S Fig. 6, which is connected with the top batten T of a scene by one or more ropes passing over a sheave U_1 and which slides up and down in guides U_3 so that when the scene is at the one extreme the counterweight is at the other extreme, and vice versa. A rope is attached to the top of this weight, passes over a sheave U_1 and then takes one or more turns around the corresponding rope pulley D of the apparatus, then under another sheave U_2 placed at the lowest position near the stage level U_4 and up to the weight to the bottom of which it is firmly attached. By this arrangement any motion given to the rope will cause the weight to move upward or downward, with a corresponding movement of the scene. Limit switches W_1, W_2 are also adjustably fitted to the guides U_3 and are so arranged that the maximum travel of the scene is fixed, and the current cut off from the solenoids N_3, N_4 as soon as the limit point is reached, causing the core to fall, the friction cones to disengage and the brakes to come into action.

The solenoids are connected through the limit switches with a push button apparatus R situated in any convenient position, and so arranged that by pressing a button the current will be passed from the supply main through the corresponding solenoid thus bringing the driving cone connected with it into gear with the rope pulley and causing the scene to rise or fall.

Each scene has three pushes viz. "Up," "Down" (connected to their respective solenoids) and "Release." These are so arranged that on pressing in either of the first two buttons the scene will continue to rise or fall until either of the limit switches is reached or until the release button is pressed, when the current will be cut off from both solenoids which will remain out of action until either the "Up" or "Down" button is pressed. A fourth button may be provided by means of which the scene can be cut entirely out of action indefinitely.

Figs. 7, 8 and 9 show a modified arrangement for laterally shifting the friction cone on the hoisting pulley into close contact with the fixed driving cones by means of the toggle levers marked 1 and 2. The lever or link 1 is fixed at one end to a point on the base plate A_5 , and at the other end to the lever 2. Lever 2 is attached to the sliding bearing C_2 and at the opposite end connected through a stirrup 3, and a rod 5 to the core of the solenoid. The rod 5, connected with the core of the solenoid, passes through the stirrup and is attached at the lower end to the lever F , Fig. 9 which works the brake K . It will be seen that on the solenoid being excited the rod 5 will be raised, thereby releasing the brake and compressing the spring 4 engaging the end of stirrup 3 and

a collar 5' fixed on rod 5. This causes the stirrup 3 to rise carrying up with it the end of the lever 2 and by the toggle action of the levers 1 and 2 the lateral movement necessary to bring the cone into close frictional contact with the driving pulley is obtained. When there are a number of scenes to be lifted as shown in Fig. 5 then there are a corresponding number of drums each on a separate axle.

In the arrangement shown in Figs. 10 and 11 the motion is given to the sliding bearing of the pulley cone through a lever *e* pivoted at the base *f* and furnished with a slot *g* for the reception of the extremity of the axle of the rope sheave. The top terminates in a fork *h* in which a piece joining the cores N_1 N_2 of the solenoids slides. This piece *i* is furnished with four collars, two of which *a* and *b* are loose, while the other two *c* and *d* are fixed. Between each fast and loose collar there is a spring *j*. By this arrangement as soon as one of the solenoids is excited the spring on the side of the lever farthest from that solenoid is compressed, pushing the lever over and giving the required lateral movement to the sliding bearing. The brake here shown is of the "Post" type. On a bracket *k* attached to or forming part of the frame *k'* carrying the solenoids is fulcrumed at *l* a lever *l'* furnished with two arms opposite to each other. These arms are fitted with laterally projecting pins *m* which lie one on each side of the main lever *e* in such a plane that any motion in either direction of the said lever will bring the lever into contact with one or other of the pins and cause the arms to rotate slightly, but always in the same direction. The arms are attached by rods *n* to the brake posts *o* pivoted at *o'* and provided with suitable brakes *k*. On the lever moving from its normal position central of the collars *c* and *d* the arms will slightly revolve pushing the posts apart and thereby take off the brake, and on the lever returning to its normal position, a spring *s* connecting the two posts *o* will draw the posts together again and cause the brakes to be applied.

Having thus described my invention and the best means I know of carrying the same into practical effect. I claim:—

1. An apparatus for raising and lowering scenes or the like, comprising two oppositely driven parallel shafts, a series of hoisting drums having their axes parallel with and intermediate of the shafts, electrically operated means adapted to bring any one of the drums into frictional driving engagement at one period with one of the shafts, so that the drum is driven in one direction, and at another period with the second shaft so that the drum is driven in the opposite direction and braking means fitted to each drum and adapted to become inoperative simultaneously with the respective

driving engagement of the drums with a shaft and to become automatically operative when the drums respectively disengage from a shaft, substantially as described.

2. An apparatus for raising and lowering theater scenes or the like, comprising two oppositely driven parallel shafts, a driving friction pulley mounted on each of the shafts, a third shaft habitually parallel with and intermediate of the driven shafts, a hoisting drum and a friction pulley carried by the third shaft, a pair of electromagnets, means adapted when operated by one of the magnets to shift one of the said pulleys in a direction to effect driving engagement between the drum pulley and one of the driving pulleys and when operated by the other magnet to shift one of the said pulleys in a direction to effect driving engagement between the drum pulley and the other driving pulley and braking means correlated with each hoisting drum and adapted to become inoperative simultaneously with the respective driving engagement of the drum pulleys with a driving pulley and to become automatically operative when the drum pulleys respectively disengage from a driving pulley, substantially as described.

3. An apparatus for raising and lowering theater scenes or the like, comprising two oppositely driven parallel driving shafts, a hoisting drum in proximity therewith, a pair of electromagnets, means adapted when operated by one of the magnets to bring the drum and one of the shafts into frictional driving engagement so that the drum is driven in one direction, and when operated by the other magnet to bring the drum and the other shaft into frictional driving engagement so that the drum is driven in the opposite direction, and a brake fitted to the hoisting drum adapted to become inoperative simultaneously with the driving engagement of the drum with a driving shaft and to become automatically operative when the drum disengages from a driving shaft, substantially as described.

4. An apparatus for raising and lowering theater scenes or the like, comprising two oppositely driven parallel shafts, a driving friction cone mounted on each of the shafts, an axle suitably mounted in proximity with the shafts, a hoisting drum and a friction cone carried by the axle, a pair of electromagnets, means adapted when operated by one of the magnets to effect driving engagement between the drum friction cone and one of the driving friction cones and when operated by the other magnet to effect driving engagement between the drum cone and the other driving cone, and a brake fitted to the hoisting drum adapted to become inoperative simultaneously with driving engagement of the drum cone with a driving fric-

70

75

80

85

90

95

100

105

110

115

120

125

130

tion cone and become automatically operative when the drum cone disengages from a driving friction cone, substantially as described.

- 5 5. An apparatus for raising and lowering theater scenes or the like, comprising a frame, two oppositely driven parallel shafts mounted on the frame, a driving friction cone fixed on each of the shafts, an axle
10 mounted in slidable bearings carried by the frame, a hoisting drum and a friction cone mounted on the axle, a pair of electromagnets, means adapted when operated by one of the magnets to move the bearings in one
15 direction so that the drum cone engages one of the driving cones, and when operated by the other magnet to move the bearings in another direction so that the drum cone engages the other driving cone, and a brake
20 fitted to the hoisting drum adapted to become inoperative simultaneously with driving engagement of the drum cone with a driving friction cone and become automatically operative when the drum cone disengages from a driving friction cone, substantially
25 as described.

6. An apparatus for raising and lowering theater scenes or the like, comprising a frame, two oppositely driven parallel shafts
30 mounted on the frame, a driving friction cone fixed on each of the shafts, an axle mounted in slidable bearings carried by the frame, a hoisting drum and a friction cone mounted on the axle, a pair of electromagnets, and a lever pivotally connected to the
35 frame, slotted to receive the end of the axle, correlated with the two magnets and adapted when operated by one of the magnets to

shift the bearings and the drum cone so that the latter engages one of the driven cones 40 and when operated by the other magnet to shift the bearings and the drum cone so that the latter engages the other driven cone, substantially as described.

7. An apparatus for raising and lowering 45 theater scenes or the like, comprising a frame, two oppositely driven parallel shafts mounted on the frame, a driving friction cone fixed on each of the shafts, an axle mounted in slidable bearings carried by the 50 frame, a hoisting drum and a friction cone mounted on the axle, a pair of electromagnets, a lever pivotally connected to the frame, slotted to receive the end of the axle, correlated with the two magnets and adapted 55 when operated by one of the magnets to shift the bearings and the drum cone so that the latter engages one of the driven cones and when operated by the other magnet to shift the bearings and the drum cone so that 60 the latter engages the other driven cone, and a brake fitted to the hoisting drum adapted to become inoperative simultaneously with driving engagement of the drum cone with a driving friction cone and become automatically operative when the drum disengages 65 from a driving friction cone, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of 70 two subscribing witnesses.

FREDERICK WILLIAM SCOTT.

Witnesses:

T. J. OSMAN,
W. I. SKERTEN.