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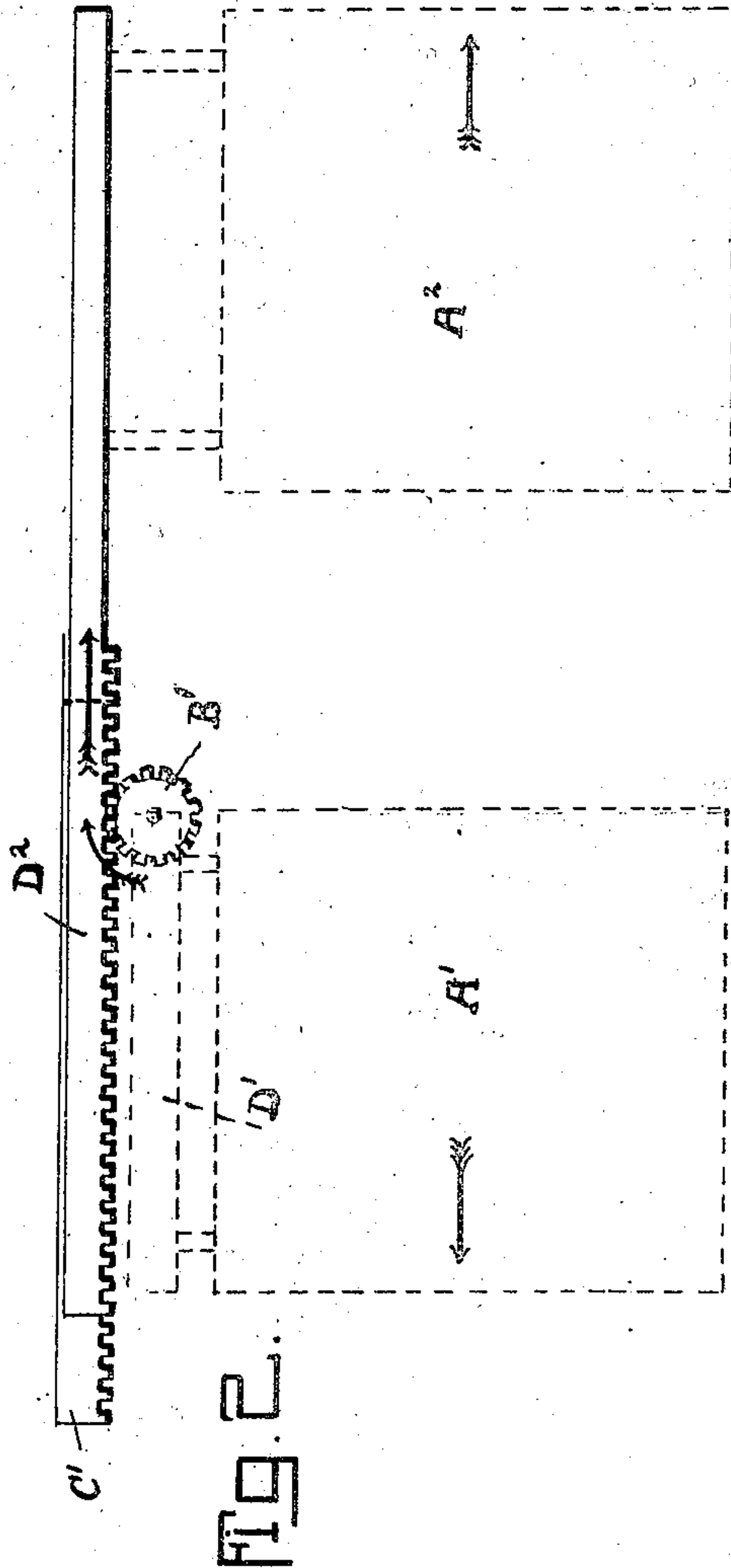
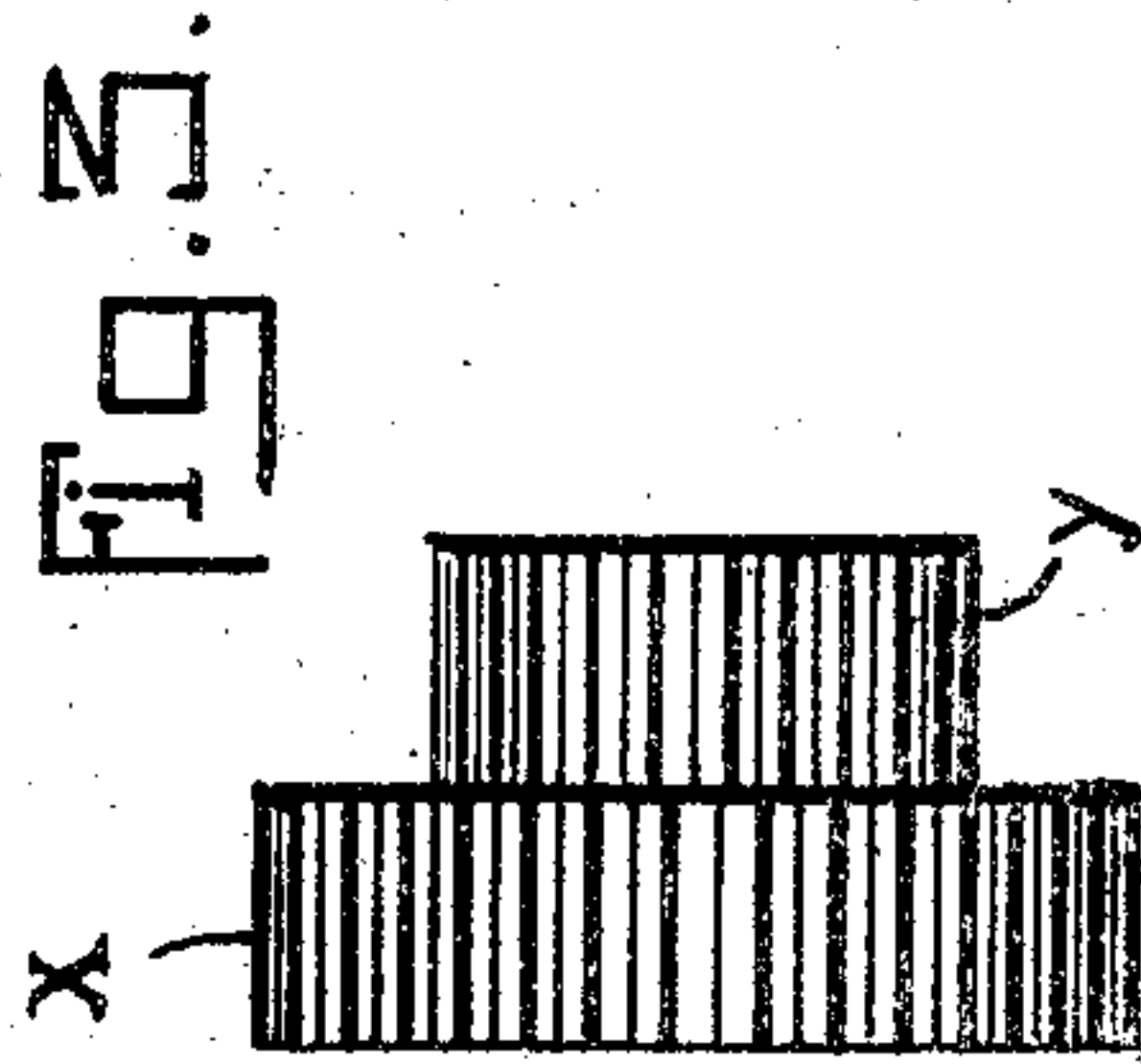
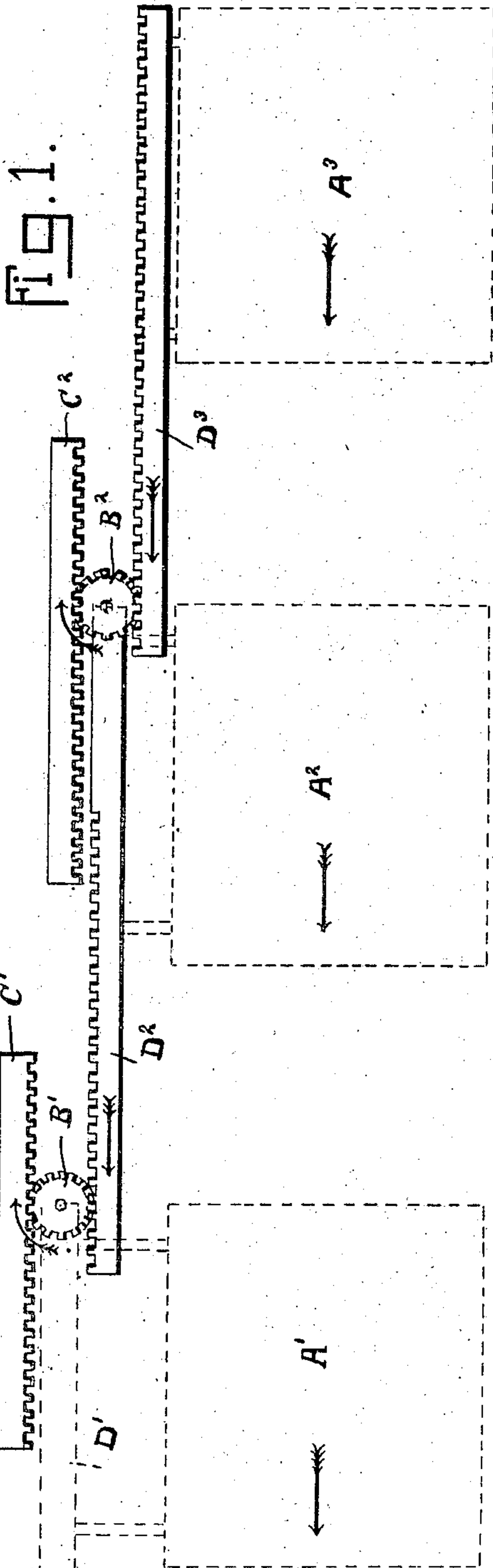
PATENTED SEPT. 25, 1906.

M. COSSEY.

DOOR CARRYING AND OPERATING DEVICE.

APPLICATION FILED APR. 22, 1905.

3 SHEETS—SHEET 1.



Witnesses
Henry R. Bauer
J. Mason Waring

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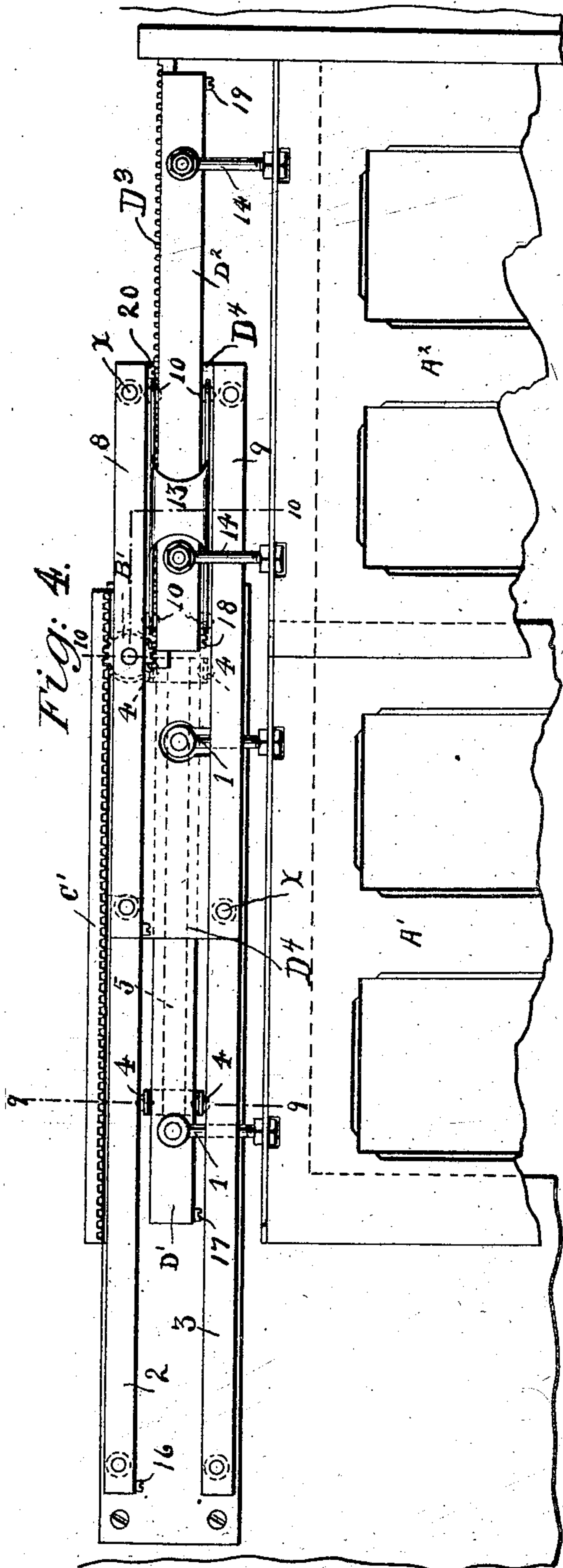
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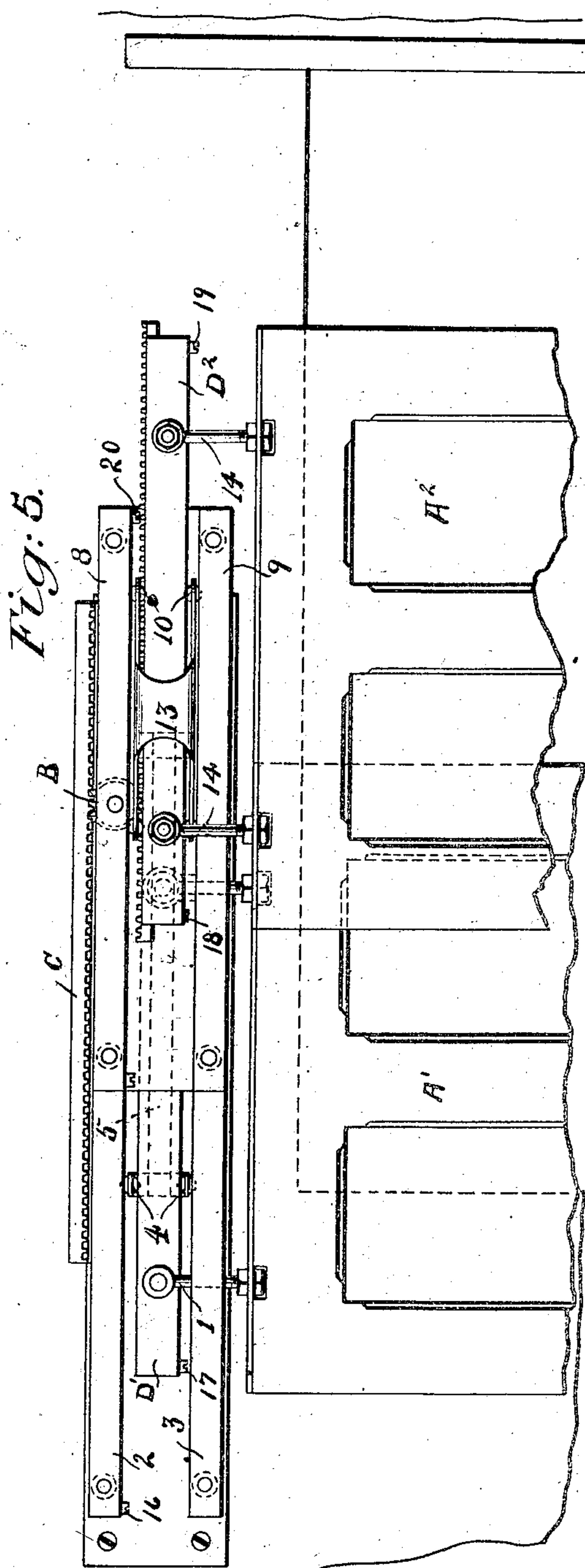
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3 SHEETS—SHEET 2.



Witnesses:
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J. Marion Mangrum



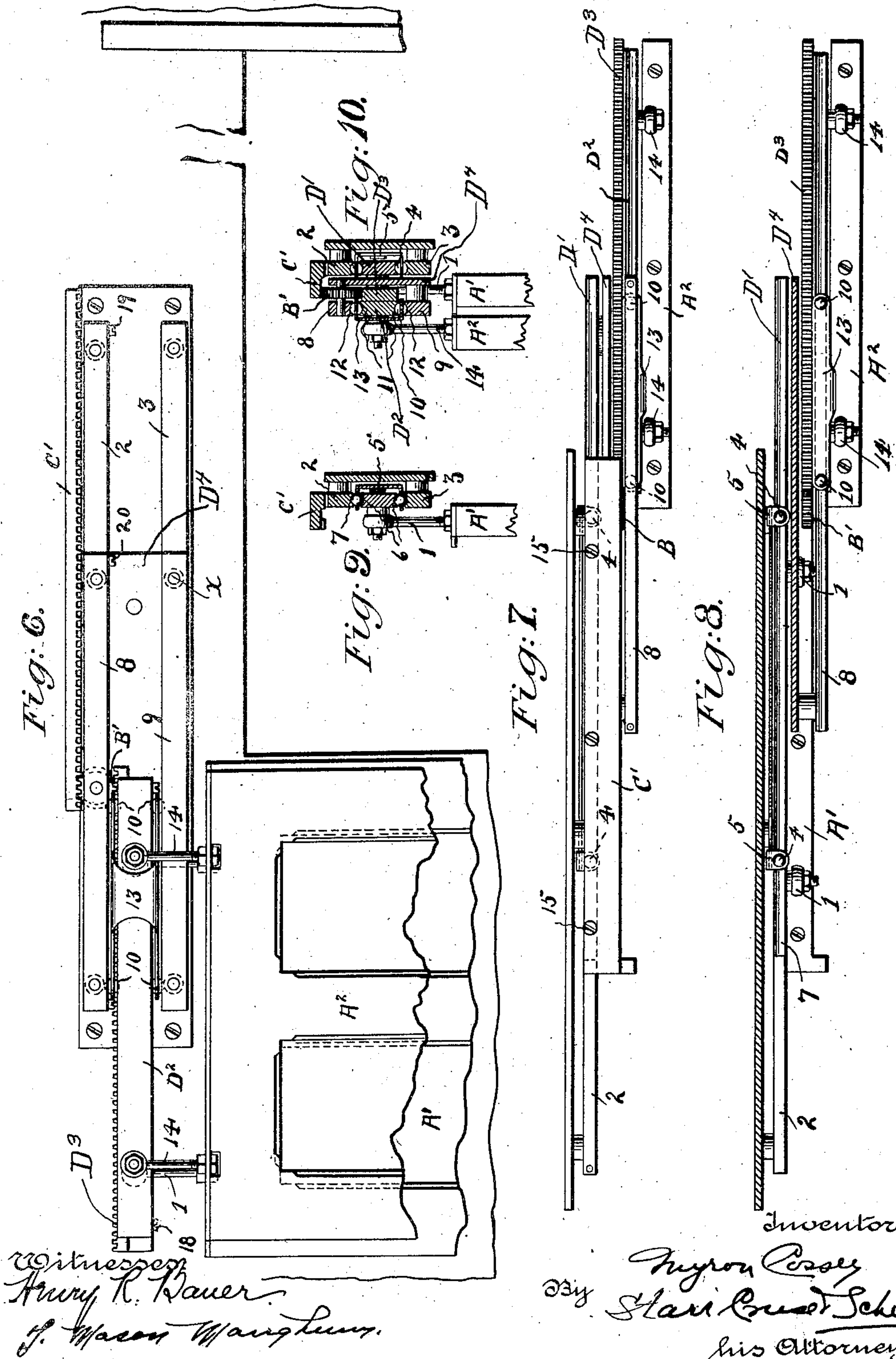
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M. COSSEY.

DOOR CARRYING AND OPERATING DEVICE.

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3 SHEETS—SHEET 3.



UNITED STATES PATENT OFFICE.

MYRON COSSEY, OF NEW YORK, N. Y.

DOOR CARRYING AND OPERATING DEVICE.

No. 832,016.

Specification of Letters Patent.

Patented Sept. 25, 1906.

Application filed April 22, 1905. Serial No. 256,847.

To all whom it may concern:

Be it known that I, MYRON COSSEY, a citizen of the United States, and a resident of the borough of Brooklyn, city of New York, State of New York, have invented certain new and useful Improvements in Door Carrying and Operating Devices, of which the following is a specification.

My invention relates to improvements in door carrying and operating devices, and is especially well adapted for cases where it is desired to move two or more doors simultaneously in the same direction and at varying rates of speed. My invention, however, is not limited to moving the doors simultaneously in the same direction, but, on the contrary, is adapted, if modified, to move them simultaneously in opposite directions and at varying rates of speed. Moreover, my invention may be applied to doors moving vertically or upwardly, as well as laterally or in a horizontal direction. In the present case it is illustrated and described as applied to laterally-movable doors. The relative speed of the doors may be varied. Thus one door may move twice as fast as the other, or it may be made to move either more or less than twice as fast.

I have found from experience that whenever operating mechanism is utilized to transmit movement from one door to another it is important, if not essential, to prevent the transmission of strains from any of the doors to the operating mechanism. If the operating mechanism directly or indirectly connects doors which are either moving in the same direction and past each other or moving in opposite directions and toward each other, any breakdown of the operating devices will result in rendering impossible any movement of the doors without a complete destruction of the operating devices. By the use of my invention I prevent transmission of any strains to the operating devices both when the doors are in normal operation and also in case of accident thereto. Obviously the device for prevention of transmission of strains may be placed, strictly speaking, intermediate the doors and operating mechanism or may be merely so constructed with respect to the doors and the operating mechanism and so connected therewith as to produce the same general result.

In the accompanying drawings, Figure 1 shows diagrammatically my invention applied to three sliding doors arranged to move

in the same direction. Fig. 2 shows diagrammatically my invention applied to two doors arranged to move in opposite directions. Fig. 3 shows a gear-wheel adapted to be used in a modification of my invention. Figs. 4, 5, and 6 are front elevations of a construction embodying a preferred form of my invention and showing two doors sliding in the same direction and in three different positions. Thus in Fig. 4 the doors are closed, in Fig. 5 they are partially open, and in Fig. 6 they are entirely open. Fig. 7 is a top or plan view with the parts in the positions shown in Fig. 4. Fig. 8 is a view, partially in section and partially in plan, showing the same construction illustrated in Fig. 7, but with certain parts removed to show more clearly the arrangement of the racks, gears, and antifriction devices. Fig. 9 is a cross-section on the line 9 9 of Fig. 4, and Fig. 10 a cross-section on the line 10 10 of Fig. 4.

Taking up, now, the diagrammatic views, Fig. 1 shows three sliding doors moving in the same direction, the door A^2 moving with twice the speed of the door A' and the door A^3 moving with twice the speed of the door A^2 or four times as fast as the door A' . These results are brought about as follows: The doors A' , A^2 , and A^3 are hung, respectively, from the sliding bars D' , D^2 , and D^3 , these bars being supported in any suitable manner to permit of longitudinal reciprocating motion. The bars D^2 and D^3 are provided, as shown, on their upper sides with rack-teeth. The bar D' is provided with a gear-wheel B' , rotatably mounted thereon in any suitable manner. This gear-wheel meshes, as shown, with the movable rack D^2 and, further, meshes with the stationary rack C' . Considering now the effect of the mechanism so far described with reference to the relative movement of doors A' and A^2 and disregarding for a moment the door A^3 , it will be seen that when the door A' is moved in the direction of the arrow—that is to say, to the left—it will cause the gear-wheel B' to rotate in a clockwise direction, due to the fact that it meshes with the fixed rack C' and that such rotation of the gear-wheel compels the movable rack D^2 and the door A^2 , suspended therefrom, likewise to move to the left and in the same direction as the door A' . Moreover, the door A^2 will move with twice the speed of the door A' . Referring again to Fig. 1 and considering now the relation of the door A^3 to the others, it will be noted that the door A^3 is

geared to the door A^2 in precisely analogous fashion to the manner in which door A^2 is geared to A' . In other words, the door A^3 is suspended from a slidable rack D^3 , corresponding with D^2 . A gear-wheel B^2 is provided corresponding with the gear-wheel B' and is mounted in similar manner thereto, and a fixed rack C^3 , corresponding with the rack C' , is also provided to mesh with said gear-wheel. The effect of the operation of this duplicate mechanism is also the same as before, which is to compel the door A^3 to move with twice the speed of the door A^2 , or, in other words, with four times the speed of the door A' .

Referring to Fig. 2, my invention is there shown diagrammatically as applied to two doors which are compelled to move in opposite directions, one twice as fast as the other. This result is attained, as will be seen by a comparison of Fig. 2 with Fig. 1, by locating the movable rack and the fixed rack on the same side of the gear-wheel. Thus, referring still to Fig. 2, C' is the fixed rack, and D^2 the movable rack, both located on top of the gear-wheel B' and of course arranged to mesh therewith. The gear-wheel B' , as before, is mounted on the movable bar D' , which in turn supports the door A' . Again, as before, the movable rack D^2 supports the other door A^2 . When the door A' is moved to the left, for example, it will be seen that the fixed rack C' will compel the gear-wheel B' to rotate in a clockwise direction, which in turn will compel the movable rack D^2 and the door A^2 to move to the right and away from the door A' and with a speed twice as fast.

Thus far all the constructions described have shown one door moving twice as fast as its adjacent door. This, however, is not a necessary condition, because by a simple modification of the gear-wheel the relative speed of the doors either in the same or in opposite directions can be varied at will. One method of doing this consists in substituting for the gear-wheel B' , for example, in Fig. 2, the duplex gear-wheel shown in Fig. 3. This duplex wheel consists merely of two gear-wheels of different diameters rigidly connected. The effect of the substitution of the duplex wheel upon the relative speed of the doors will depend upon whether the larger wheel or the smaller is made to mesh with the fixed rack. Thus if the large wheel X be made to mesh with the fixed rack C' and the small wheel Y with the movable rack D^2 then the movable rack, and consequently the door A^2 , will move less than twice as fast as the door A' , the amount of difference in speed depending upon the relative size of said wheels X and Y . If, on the contrary, the small wheel Y is made to mesh with the fixed rack and the large wheel X with the movable rack D^2 , then things will be reverse, and the door A^2 will move with more than twice the

speed of the door A' . Of course it will be understood that the duplex wheel shown in Fig. 3 may be substituted not only for the gear-wheel B' in Fig. 2, as just described for purposes of illustration, but may also be substituted for the gear-wheels shown in Fig. 1 or in any other construction embodying my invention where it is desired to move one door either more or less than twice and more than equally as fast as another.

The foregoing description of the diagrammatic views of Figs. 1, 2, and 3 will now make the practical working constructions shown in the remaining figures easily understood.

In the practical operation of my invention it is desirable to provide some means for preventing the transmission of strains from the doors to the racks and gear. A preferred means for this purpose is to provide a door-hanger comprising two outer bars or guides, which constitute one element, and an intermediate bar, which constitutes another element, with antifriction devices between the outer bars or guides and the intermediate bar. One of these elements is designed to have endwise movement with respect to the other, and in the present case I have, as illustrated in Figs. 4 to 10, shown the intermediate bar movable with respect to the outer bars or guides. Thus in the said figures it will be seen that there are two doors shown, A' and A^2 , the door A' being connected by links 1 1 to a movable bar D' , which bar is slidably supported upon antifriction devices between the fixed bars or guides 2 and 3. As shown, these antifriction devices comprise balls 4, which are loosely held in fixed relation to each other in a well-known manner by a ball-carrier 5, the balls themselves running in longitudinal grooves 6 and 7, (see Figs. 9 and 10,) located on the respective edges of the fixed bars or guides 2 and 3. It will readily be understood that the bar D' might be fixed and become the guide and the bars 2 and 3 be movable. Of course in this event the links 1 would have to be connected to the bars 2 and 3.

As shown more clearly in Figs. 9 and 10, the antifriction devices or balls serve not only as antifriction devices, but also to retain the intermediate bars in operative position with regard to the outside bars and prevent any movement between the movable element and the fixed element at a right angle to the endwise movement. This has several advantages. In the first place it does away with the necessity of any other retaining means, and in the second place it affords an absolutely sure means of keeping the intermediate bar in its proper relation to the outside bars and also permitting a certain amount of flexibility. Furthermore, in the event of any one of the doors striking an obstruction during movement the resulting strains are distributed over all the balls,

which obviously reduces the strain on any one ball. The aforesaid movable bar D' carries a pair of guides 8 9, similar to the other guides 2 3, already described. In the precise form shown, Figs. 5 and 10, these guides 8 and 9 are each rigidly secured to a common base-plate D^4 by bolts or rivets x , and the base-plate D^4 is secured to the movable bar D' , so as to move with it. One of the links 1 may be utilized to connect the bar D' and base-plate D^4 , as indicated in Figs. 8 and 10, or they may be connected together by other means. Moreover, there is provided a movable bar D^2 , similar to the movable bar D' and adapted, like D' , to slide back and forth between the guides 8 9 and running, as before, on balls 10, located in the longitudinal grooves 11 12 (see Fig. 10) and held together by the ball-carrier 13. Like D' , the movable bar D^2 is connected to a door, in this case A^2 , through the links 14. A rack D^3 is rigidly secured to the movable bar D^2 , the teeth of said rack engaging the under side of a gear-wheel B' , as will be more fully described hereinafter. Thus the construction just described in detail will be seen to comprise two doors, A' and A^2 , the door A' being connected to a bar D' , slidably mounted on antifriction devices between fixed guides 2 3, and the door A^2 being likewise connected to the movable bar D^2 , slidably mounted on antifriction devices between the guides 8 9, which guides are connected to and carried by the aforesaid movable bar D' , to which the other door A' is connected. The particular form of mechanism which I have shown for connecting and mutually operating these doors comprises the gear-wheel B' , rotatably mounted on and carried by the movable guide 8, which in turn is rigidly secured to and carried by the movable intermediate bar D' , which carries the door A' . This gear-wheel B' meshes both with the fixed rack C' and also with a movable rack D^3 , which is rigidly secured to and practically forms part of the movable intermediate bar D^2 , which in turn supports the door A^2 . Consequently when either the door A' or the other door A^2 is moved to the left, for example, the other door must necessarily move in the same direction and the door A^2 must always move at twice the rate of speed as the door A' . If the moving power is applied to the door A' , the movable bar D' must also move and drag after it the gear-wheel B' , which being compelled to rotate by the fixed rack C' drives the movable bar D^2 through the intervention of its rack which is in mesh with the said gear-wheel, and thus drives the bar D^2 and its door A^2 in the same direction as the door A' , but with twice its speed. It will be noted (see particularly Fig. 10) that the guides 8 9, mounted on the movable bar D' , are not in the same vertical plane as the other pair of guides 2 3. This permits the movable bar

D^2 and its door A^2 also to occupy different planes from the movable bar D' and its door A' , so that the door A^2 is able to slide in front of the door A' without interference.

Having described my invention, I claim—

1. In a door carrying and operating device, the combination with a plurality of doors of operating mechanism adapted to transmit movement from one door to another and means arranged to prevent transmissions of strains to said operating mechanism.

2. In door carrying and operating devices, the combination with operating mechanism for connecting a plurality of doors and adapted to transmit movement from one door to another, of hangers adapted to be arranged intermediate the doors and said operating mechanism and adapted both to support the weight of a door and prevent the transmission of strains to said operating mechanism.

3. In door carrying and operating devices, the combination with operating mechanism for connecting a plurality of doors and adapted to transmit movement from one door to another, of hangers adapted to be arranged intermediate the doors and said operating mechanism and comprising two elements—one an intermediate bar and the other comprising two outside bars rigidly secured together, one of said elements being movable with respect to the other and adapted to carry a door.

4. In door carrying and operating devices, endwise-movable bars, fixed guides upon which said bars move, means for preventing movement between the movable bars and their guides at right angles to the endwise movement, means for connecting a door to each movable bar, and operating mechanism for transmitting movement from any one of said movable bars to all the others.

5. In door carrying and operating devices, the combination with a plurality of hangers each comprising two outside bars constituting one element and an intermediate bar constituting another element—one of said elements being movable with respect to the other, and the movable element being adapted to be connected to a door—of operating mechanism comprising racks and a gear adapted to transmit movement of each movable element to all the other movable elements.

6. In door carrying and operating devices, the combination of a plurality of racks and gear for transmitting motion from one door to another door, and door-hangers arranged intermediate the doors and said racks and gear, and each comprising two outside bars constituting one element and an intermediate bar constituting another element, one of said elements being movable with respect to the other and said movable elements adapted to sustain the doors.

7. In door carrying and operating devices, the combination with a plurality of racks and a gear arranged to impart motion from one door to another door, and in the same direction, of a plurality of hangers each comprising two outside bars constituting one element and an intermediate bar constituting another element, one of said elements being movable with respect to the other and means for connecting the movable element to a door.

8. In door carrying and operating devices, the combination with a plurality of racks and a gear arranged to impart motion from one door to another door and in the same direction but at varying rates of speed, and a plurality of door-hangers each comprising two outside bars comprising one element and an intermediate bar comprising another element, one of said elements being movable with respect to the other, and the movable element having means for carrying a door.

9. In door carrying and operating devices, the combination of a gear-wheel and racks adapted to be connected to doors for transmitting movement of one door to another, and means including antifriction devices for sustaining the weight of the doors and relieving the racks and gears from strain.

10. In door carrying and operating devices, the combination of a gear-wheel and racks adapted to be connected to doors for transmitting movement of one door to another, and means including antifriction devices adapted to be interposed between the doors and the racks and gear for sustaining the weight of the doors and relieving the racks and gear from strain.

11. In door carrying and operating devices, the combination of a plurality of sets of three bars each, the said three bars of each set being parallel and situated one above the other, each set being composed of two members, one of which comprises two outer bars rigidly secured together, and the other a central bar; antifriction devices interposed between said central and outer bars; devices for connecting one of said members of each set with a door, the other member being secured to cause relative motion between it and the first member, and means including racks in mesh with a gear whereby the lateral movement of each movable member is controlled by the movement of every other movable member.

12. In door carrying and operating devices, the combination of endwise movable-bars arranged to reciprocate between outer bars situated on either side thereof and substantially parallel therewith; antifriction devices interposed between said movable and outer bars; devices on each of said movable bars for connecting it to a door, and means including racks in mesh with respective gears whereby the endwise movement of each

movable bar is controlled by the endwise movement of every other movable bar.

13. The combination with a plurality of racks and a gear, of a plurality of hangers, each comprising two outside bars constituting one element and an intermediate bar constituting another element—one of said elements being movable with respect to the other and said movable elements having means for connecting them to doors—and balls arranged on each side of said intermediate bar and in grooves provided in the adjacent surfaces of the intermediate and outside bars to retain said intermediate bar in operative position with regard to the outside bars.

14. In door carrying and operating devices, the combination of a pair of fixed guides; a movable bar slidably mounted between said guides; antifriction devices arranged between said movable bar and said guides; a gear-wheel carried by said movable bar; a pair of guides carried by said movable bar; a second movable bar slidably mounted between said last-named guides; antifriction devices between said last-named guides and said second movable bar; a rack carried by said second movable bar and in mesh with said gear-wheel; and a stationary rack also in mesh with said gear-wheel.

15. In door carrying and operating devices, the combination with a plurality of movable bars, means for connecting a door to each movable bar, guides for each movable bar, antifriction devices arranged on each side of each said movable bar and intermediate it and its guides, a rack rigidly secured to the first set of guides and another to each succeeding set of guides, excepting the last, a rotatable gear-wheel connected and traveling with each set of guides, excepting the first set, and arranged to mesh with the rack affixed to the immediately preceding set of guides, and a movable rack connected and moving with each movable bar excepting the first and meshing respectively with the aforesaid gear-wheel attached to the guides supporting its movable bar—the first set of guides being fixed and immovable and each succeeding set being rigidly connected and moving with the immediately preceding movable bar.

16. In door carrying and operating devices, the combination with a plurality of movable bars, means for supporting a door from each of the movable bars, a pair of guides arranged on each side of each movable bar, one pair of guides being fixed and the other guides movable, antifriction devices arranged on each side of each movable bar and intermediate it and its guides, and means comprising racks and gear adapted to transmit movement from either movable bar to all the other movable bars.

17. In door carrying and operating devices, the combination with a plurality of movable

bars, means for supporting a door from each of the movable bars, a pair of guides arranged on each side of each movable bar, one pair of guides being fixed and all the other guides movable, antifriction devices arranged on each side of each movable bar and intermediate it and its guides, and means comprising racks and a gear whereby a movement imparted to any one of the movable bars will produce a movement of each other bar and at a rate of speed different from that of every other bar.

18. In door carrying and operating devices, the combination with a plurality of movable bars, means for supporting a door from each movable bar, a pair of guides arranged on each side of each movable bar, one pair of guides being fixed and all the other guides movable, antifriction devices arranged on each side of each movable bar and intermediate it and its guides, and means comprising racks and a gear, whereby any movement imparted to any one of the movable bars will produce a movement of every other movable bar in the same direction, but at varying rates of speed.

19. In door carrying and operating devices, the combination with a plurality of movable bars, means for supporting a door from each movable bar, a pair of guides arranged on each side of each movable bar, antifriction devices arranged on each side of each movable bar and intermediate it and its guides, and means, comprising a fixed rack, a movable rack and a movable gear meshing with both racks, for compelling movement of all the other movable bars upon the movement of either of them.

20. In door carrying and operating devices, the combination with a pair of fixed guides, a movable bar supported to slide between said guides, a pair of movable guides, a second movable bar supported to slide between said movable guides, means for rigidly connecting the first-named movable bar to the movable guides, a gear-wheel carried by the movable guides, a rack rigidly connected to the second movable bar and meshing with said gear-wheel, and a stationary rack with which said gear-wheel meshes.

21. In door carrying and operating devices,

the combination of two movable bars, means for supporting a door from each movable bar, a pair of guides arranged on each side of each movable bar, one pair of guides being fixed and the other pair movable, connections between the movable pair of guides and the bar supported between the fixed guides, and means comprising racks and a gear whereby a movement imparted to any one of the movable bars will produce a movement of the other bar.

22. In door carrying and operating devices, the combination of two movable bars, means for supporting a door from each movable bar, a pair of guides arranged on each side of each movable bar, said guides being in different vertical planes and one pair of guides being fixed and the other pair movable, and the movable guides being connected to the movable bar supported between the fixed guides, and means comprising racks and gear whereby any movement imparted to one of the movable bars will produce a movement of the other movable bar.

23. In door carrying and operating devices the combination with operating mechanism for connecting a plurality of doors and adapted to transmit movement from one door to another, of hangers adapted to be arranged intermediate the doors and said operating mechanism, each hanger comprising three bars of which the two outer bars are connected together and constitute one element, and of which the middle bar constitutes another element, and one of these elements being movable with respect to the other, and the opposing edges of the two outer bars and of the middle bar being grooved, means for connecting said movable element to a door, and balls supported in the grooves between the middle and outer bars for preventing movement between the middle and outer bars at right angles to the endwise movement of the movable member.

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

MYRON COSSEY.

Witnesses:

HENRY R. BAUER,
S. E. STEVEN.