

No. 774,828.

PATENTED NOV. 15, 1904.

J. CAMPBELL.
HOISTING APPARATUS.

APPLICATION FILED MAR. 4, 1903.

NO MODEL.

5 SHEETS—SHEET 1.

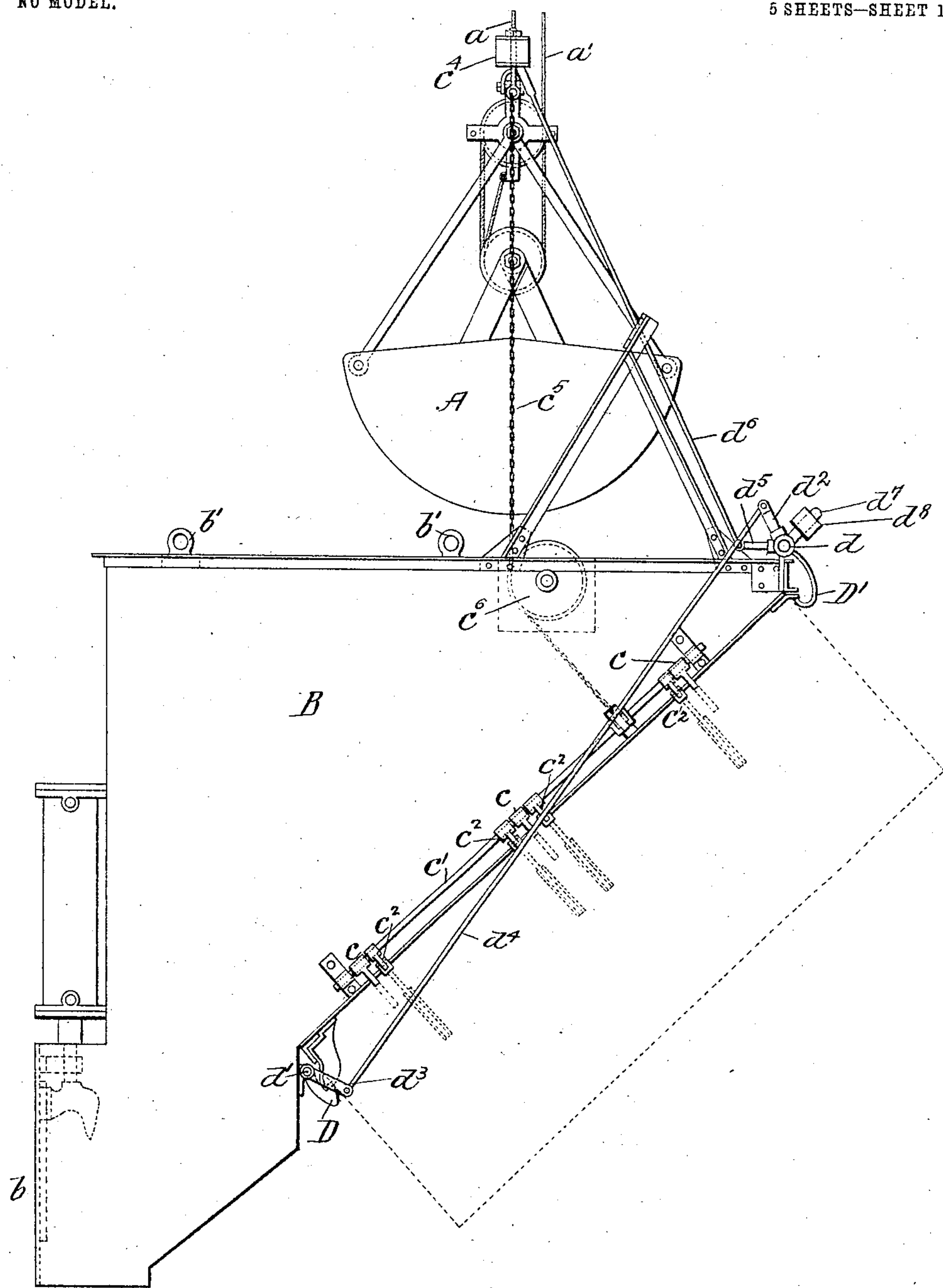


Fig. 1.

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5 SHEETS—SHEET 2.

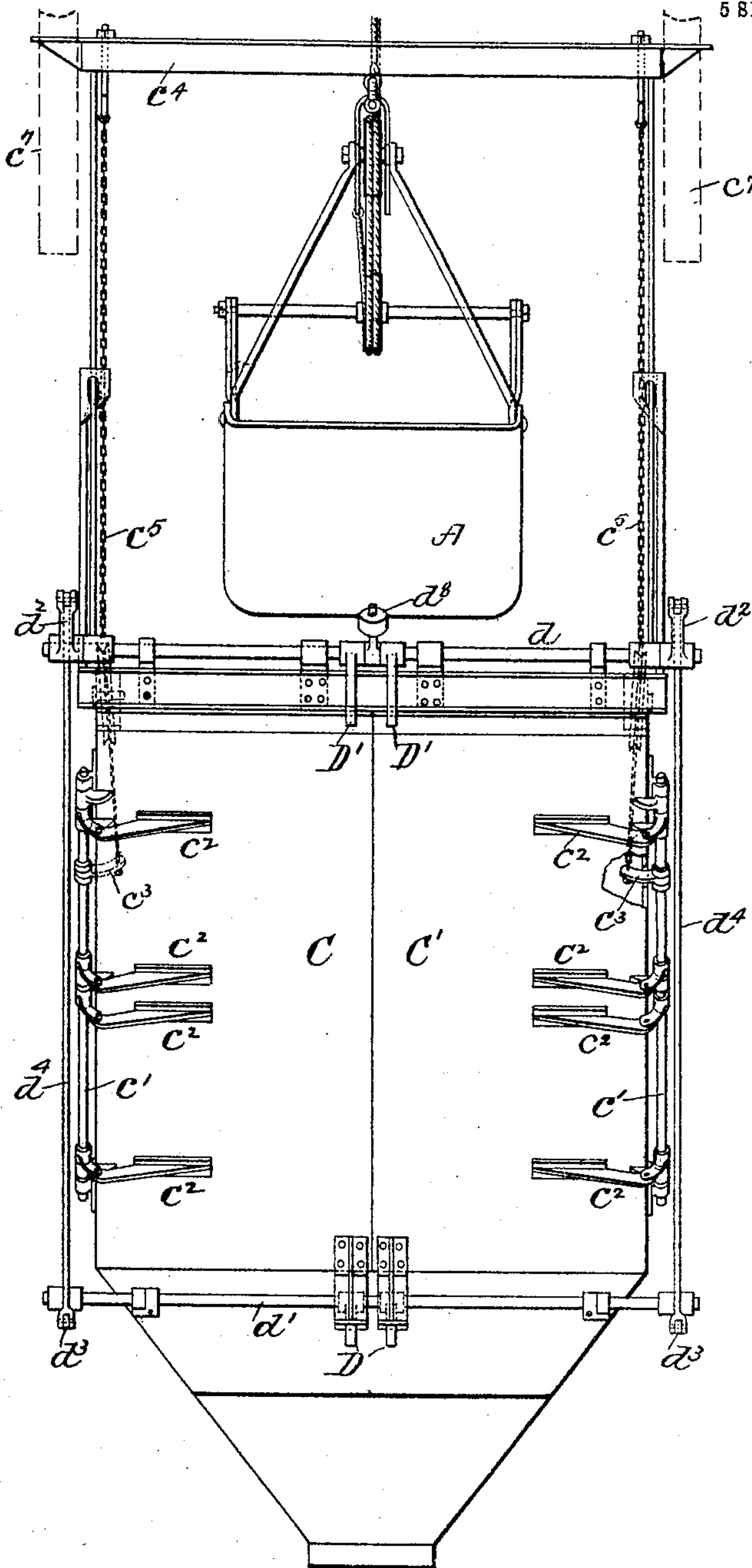


FIG. 2.

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5 SHEETS—SHEET 3.

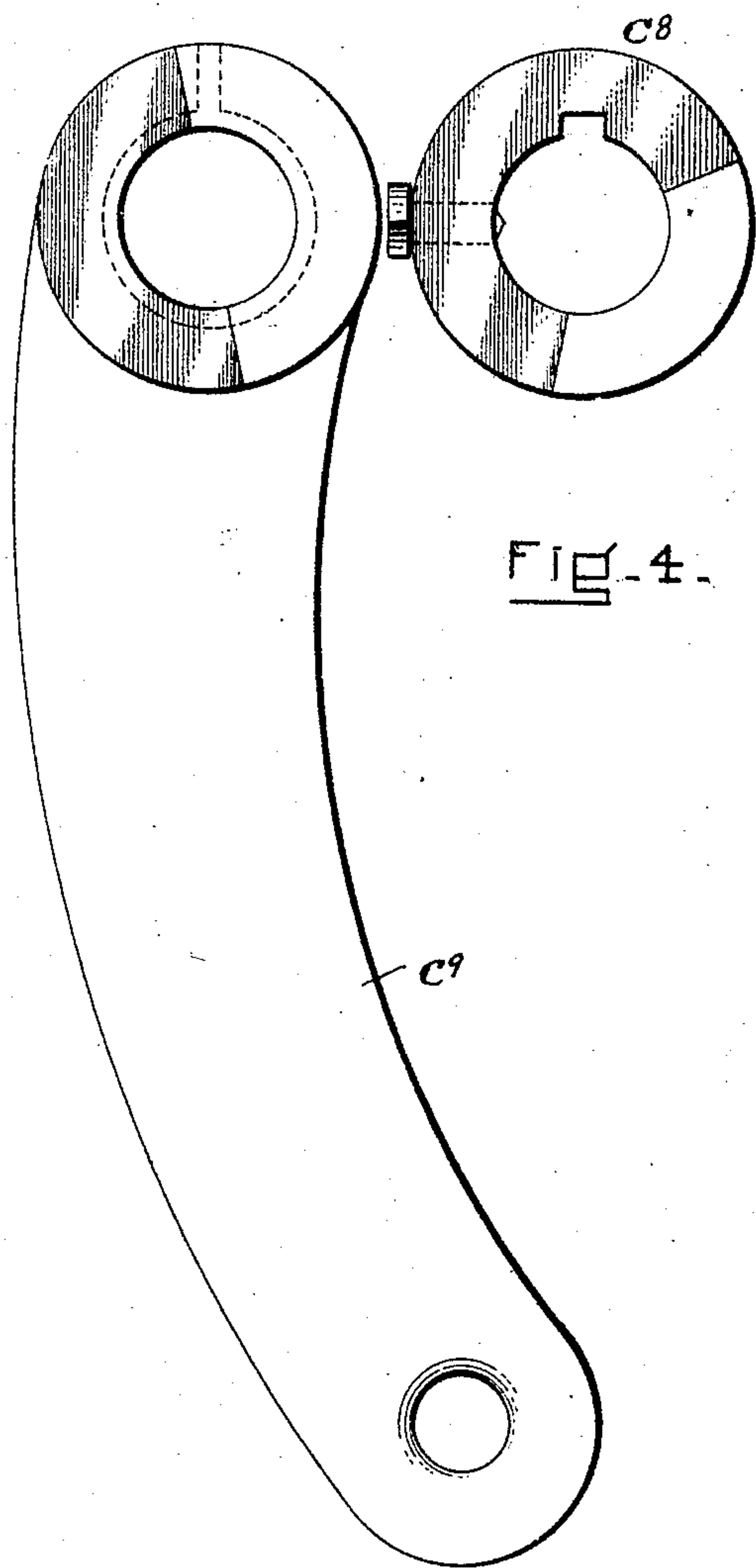


Fig. 4.

Fig. 3.

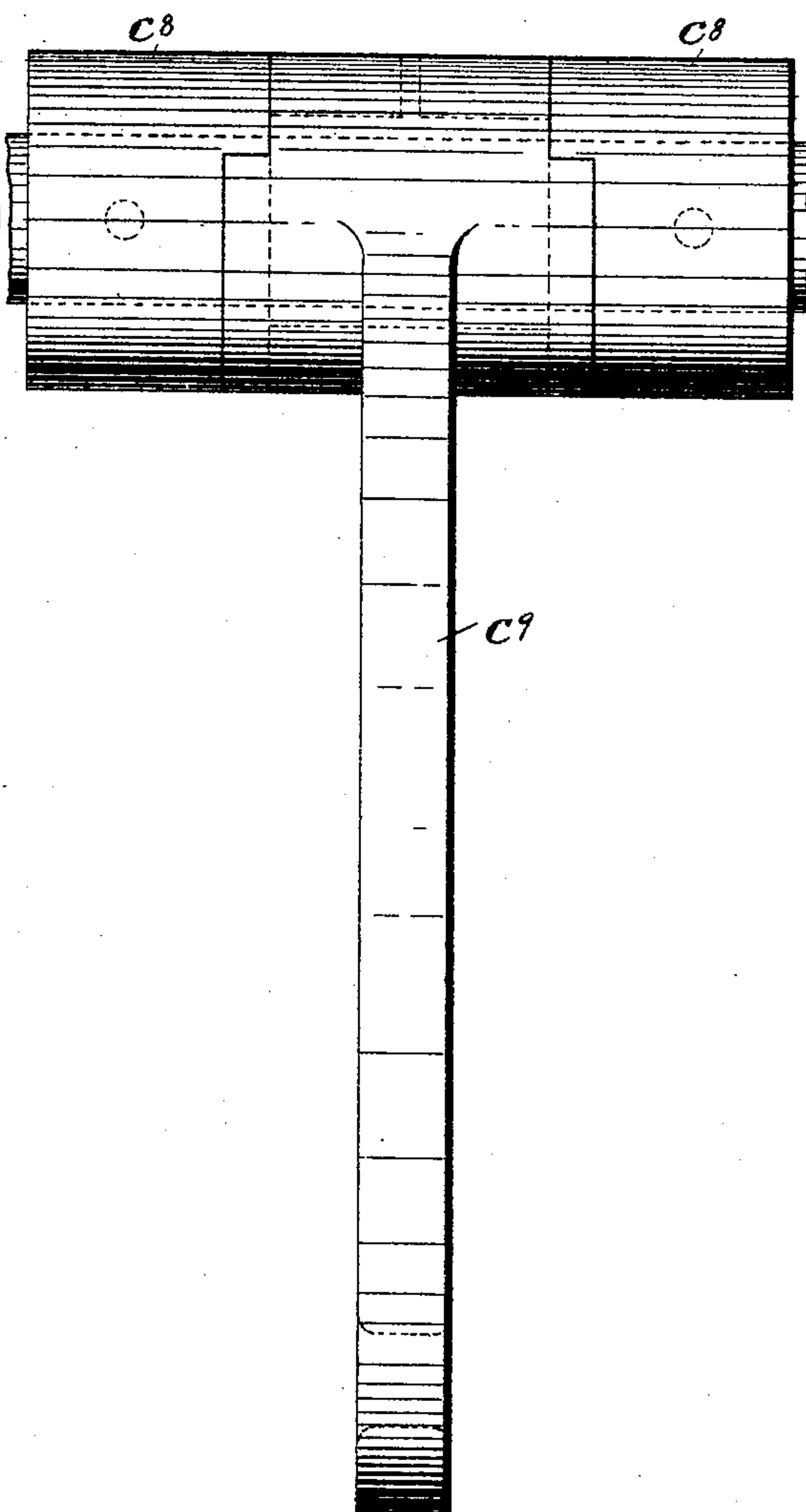


Fig. 5.

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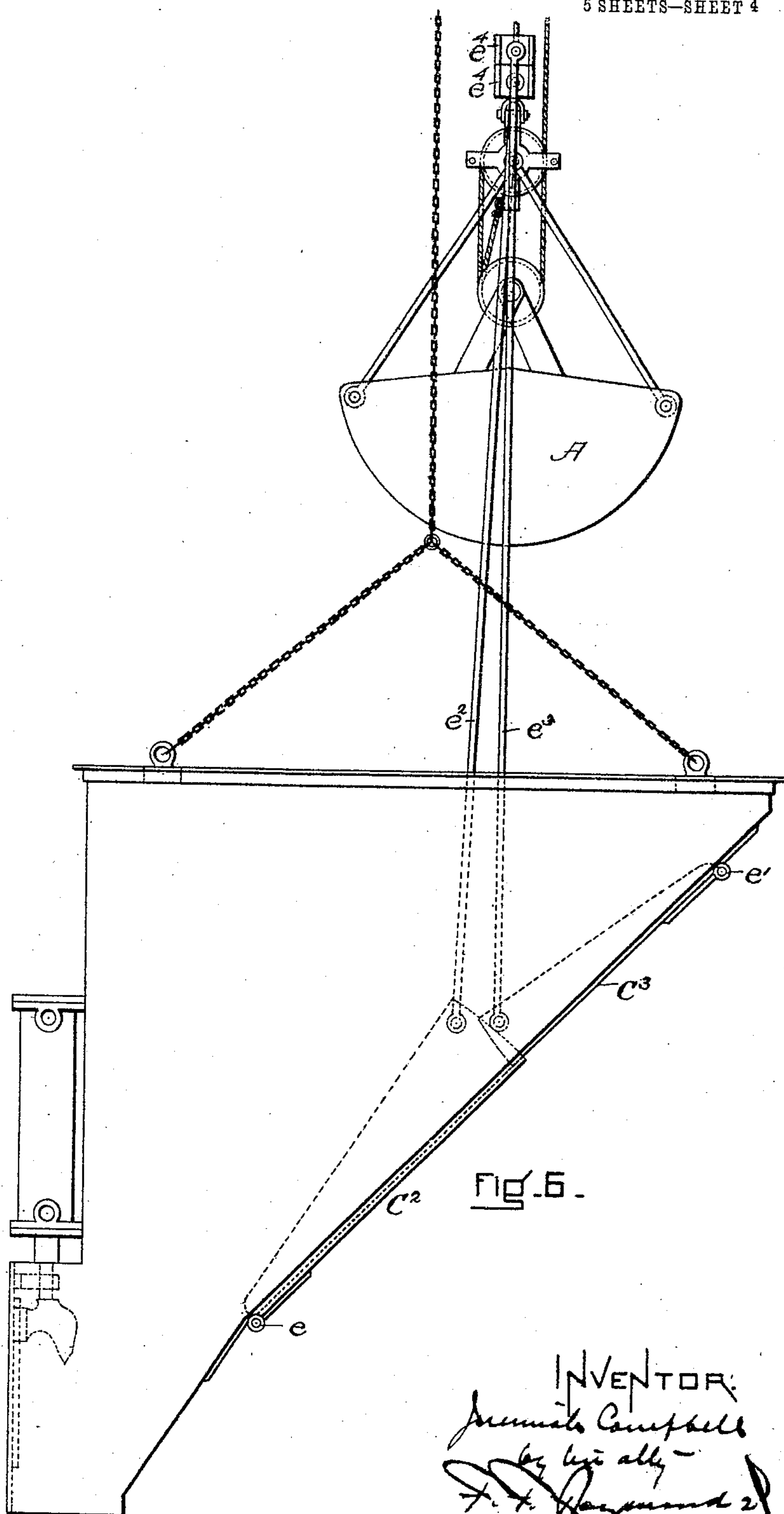
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5 SHEETS—SHEET 4



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NO MODEL.

5 SHEETS—SHEET 6.

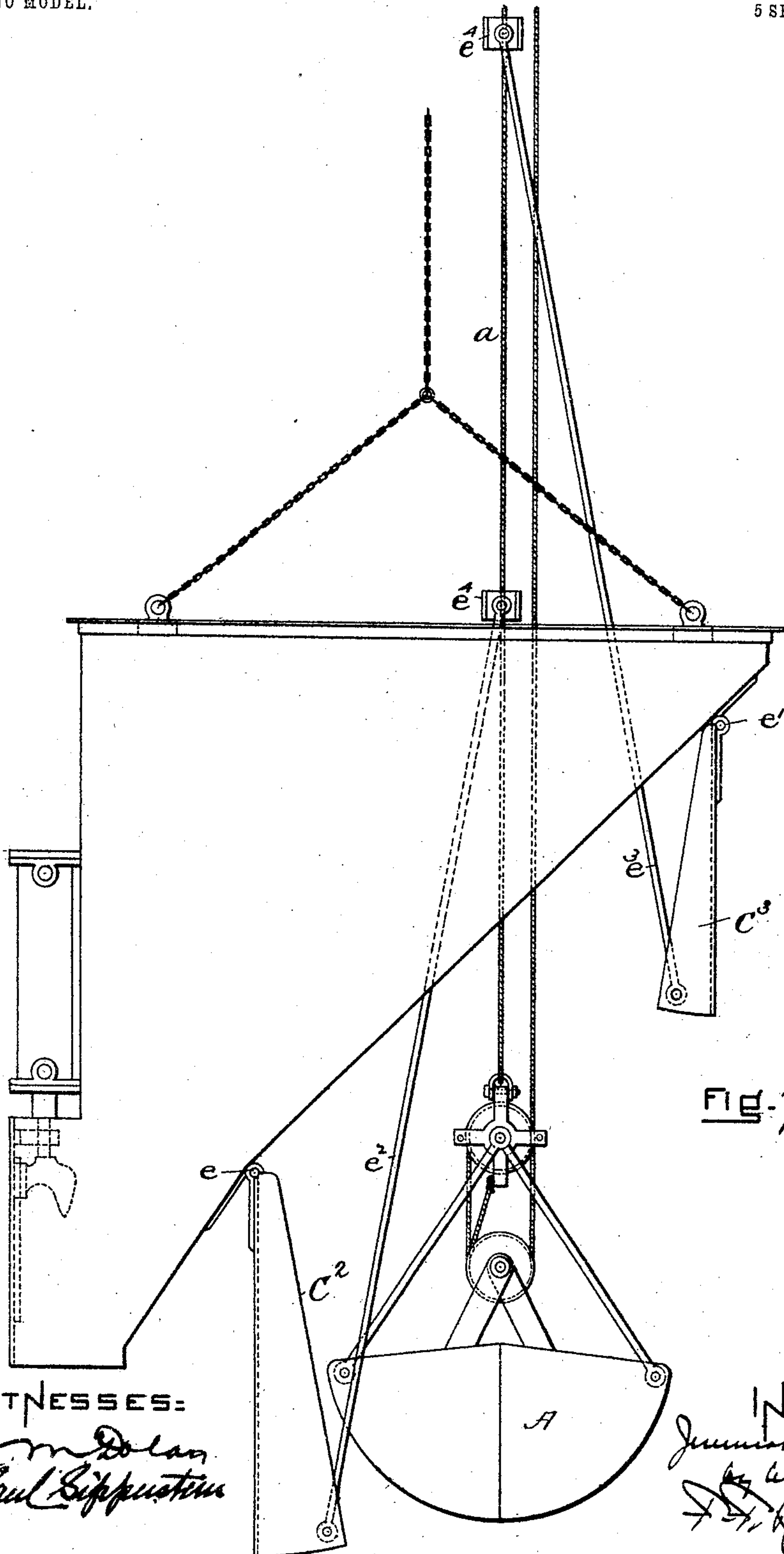


Fig. 7.

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UNITED STATES PATENT OFFICE.

JEREMIAH CAMPBELL, OF NEWTON, MASSACHUSETTS.

HOISTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 774,828, dated November 15, 1904.

Application filed March 4, 1903. Serial No. 146,184. (No model.)

To all whom it may concern:

Be it known that I, JEREMIAH CAMPBELL, a citizen of the United States, and a resident of Newton, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Hoisting Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification, in explaining its nature.

The invention relates to means for hoisting coal or other material and for discharging it from the hoisting device through a hopper which is in line with the vertical movement of the hoisting device, and whereby a lateral movement of the hoisting device is rendered unnecessary, and the apparatus combining a hoisting device and a hopper correspondingly narrow to permit of the use of the hoisting apparatus in relatively narrow compass or spaces. To permit this relation between the hopper and the hoisting device, it is necessary that the hopper should be provided with one or more gates which open to permit the downward movement of the hoisting device through the hopper and which remain open while the hoisting device is below the hopper and until it is lifted above the hopper, and which are then closed to form a part of the bottom or wall of the hopper, and upon which the contents of the hoisting device may be discharged and by which the said contents may be deflected or guided to the hopper-outlet. It is desirable that the hopper gate or gates be automatically opened and closed, also that the hopper be provided with means for vertical adjustment. The grab and hopper are supported by any suitable form of tower or support and I have not considered it necessary to illustrate it or the engine or means for operating the hoisting device or of suspending or adjusting the hopper, as such are well known in the art.

I will now describe the invention in conjunction with the drawings forming a part of this specification, wherein—

Figure 1 is a view, principally in side elevation, of a hoisting device and hopper, the hopper showing in dotted outlines the open posi-

tion of one of its gates. Fig. 2 is a view in end elevation of the hopper with its gates closed and the hoisting device. Figs. 3, 4, and 5 are detail views of a gate-closing arm, to which reference will hereinafter be made. Figs. 6 and 7 illustrate a hopper having a modified form of closing-gates.

Referring to the drawings, A represents a grab of conventional form, which is lifted and lowered and opened and closed by lifting-ropes in the ordinary or well-known way. It is of the kind that automatically loads and discharges itself. I do not, however, confine myself to this particular form of hoisting device. *a* is its lifting and lowering rope, and *a'* its closing and opening rope.

B is the hopper. *b* is its outlet, which is arranged at one side of the vertical path in which the grab A travels. The hopper is preferably swung on chains by means of the eyes *b'*, and by means of which it is vertically adjusted. It is of sufficient size in horizontal section to permit of the movement through it of the grab or hoisting device, and that portion of its bottom or wall which obstructs the vertical movement of the grab is made in the form of gates, which are opened to permit the downward movement of the grab through the hopper, are held open while the grab is below the hopper, and are closed and held closed when the grab is lifted above the hopper to a discharging position. I prefer that the gates open and close automatically and also that these movements be effected by the devices or some of them which operate the grab, and I have so shown them. I have illustrated the hopper as having in Figs. 1 and 2 gates which open sidewise, and in Figs. 6 and 7 gates which open vertically downward; but I do not confine myself to either form or to the number of gates.

C C' represent the gates of Figs. 1 and 2. They form when closed an inclined wall of the hopper, which is also its bottom or a portion of its bottom, and then act to receive in whole or in part the load delivered to the hopper by the grab when in discharging position and to direct it toward the hopper-outlet *b*. Each gate is hinged at its outer edge by hinge-arms *c* to a rock-shaft *c'*, secured upon the

outer side of an end wall of the hopper. These hinge-arms are free to turn on the rock-shaft. The gates are closed by means of the lifting-arms c^2 , which are keyed to the rock-shaft and bear against the bottom of the gate and serve to lift it when the rock-shaft is revolved. A quarter-turn of the rock-shaft is sufficient for this purpose, and this movement is communicated to it by means of a rock-lever c^3 , mounted upon the shaft and connected with a vertically-movable cross-bar or saddle c^4 by means of a chain c^5 , passing about a roll c^6 on the hopper. The cross-bar c^4 is of a length to hold both chains c^5 sufficiently apart to provide space for the grab and also to hold them in line with the grab-lifting rope a , which passes through the center of the arm. The arm is lifted by the grab-hoisting rope or grab to close the gates, and when released by said rope upon its descent the gate-closing arms are released. (See Fig. 2.) The ends of the bar may be guided in vertical guideways c^7 of a length corresponding to the movement or travel of the bar, which is quite short, as it is only necessary to have a movement sufficient to turn the rock-shaft arms half a revolution, which is a quarter more than is necessary for the operation of the gates, the additional quarter movement being provided for the purpose of permitting the rock-shaft arms, which have lost motion upon the rock-shaft, to fall to a vertical position, which will bring them and their operating-chains adjacent to the under walls of the hopper and out of the line of the movement of the dumped material. This is desirable, because the rocker-arms and chains are for the purposes of convenience upon the inside of the hopper. The customary way of providing these rock-shaft arms with lost motion is represented in Figs. 3, 4, and 5, where c^8 represents two collars fast to the shaft, and c^9 the rock-shaft arm, mounted upon the shaft and having shoulders which come in contact with shoulders upon the collars, but which are so formed as to permit the arm to have a lost motion of about a quarter-revolution upon the rock-shaft before an engaging connection with the collars is made. By the means described it will be seen that the gates are permitted to be opened upon the downward movement of the grab and to remain open so long as the grab is below the hopper and that they are closed when the grab is lifted above the hopper and then held closed. I prefer that the gates have in addition latches to automatically lock them in their closed position and at points near their outer corners, and which shall also be automatically released upon the downward movement of the grab, and for this purpose I have represented the two locking latches or pawls $D D'$, one set for each gate. Each latch is a suspended one and has a shoulder or notch upon its inner edge, upon which the gate rests when in closed position, and they are so held that the gate in closing comes

into contact with them and moves them outwardly until in line with the shoulders, when the latches automatically close under the gate. The latch D' is mounted upon the pivot-shaft d and the latch D upon the pivot-shaft d' . The pivot-shaft d has an arm d^2 , which is connected with an arm d^3 on the pivot-shaft d' by a link d^4 . The pivot-shaft d also has an arm d^5 , from which extends upward a push-rod d^6 . The pivot-shaft d also has an arm d^7 , upon which is an overbalancing-weight d^8 , which operates to hold the latches in a position to be engaged by the gate and in a closed position, the movement of one latch by means of the rod d^4 causing a similar movement, but in reverse direction of the other rod. It will thus be seen that the latches are always held when the gates are open in an engaging position, and that the gates automatically engage them upon closing by coming into contact with them, pushing them slightly outward until they have cleared the shoulders, when the latches automatically close to bring the shoulders under the gates. To release the latches for the purpose of permitting the gates to open, the push-rods are made of such length and are so arranged that their upper ends will close under the bar c^4 when said bar is raised to very nearly its highest position. The downward movement of the bar will then move the push-rods downward, causing them to turn the pivot-shafts d , and thereby cause both sets of latches to be moved outward from contact with the gates and to be held so removed until the gates have opened. Upon the upward movement of the cross-bar c^4 the push-rods are permitted to be moved outward by the overbalancing-weights d^8 and the latches to assume their automatic latching position.

In Figs. 6 and 7 the gates, which I have there lettered $C^2 C^3$ and which perform the offices of the gates $C C'$, are attached to the hopper to open downward therefrom to provide the clearance for the grab, instead of to open sidewise. They are hinged to the hopper at c^e , respectively, and they are opened and closed by the connecting-rods $c^2 c^3$, respectively, which are connected with a cross-bar c^4 , which is like the cross-bar c^4 and which is lifted and permitted to drop by the grab-hoisting rope a , as above described.

I have shown mounted upon the hopper a coal-breaking device, which forms the subject-matter of a separate application.

The operation of the device has been given in connection with the description of its construction, and such advantages as have not already been stated are sufficiently obvious.

Having thus fully described my invention, I claim and desire to secure by Letters Patent of the United States—

1. A vertically-movable hoisting device, and a stationary hopper adapted to receive the contents of the device, arranged in the line

of its vertical travel and provided with a wall which is removable to form a clearance for the hoisting device and which is closed and held closed to form a part of the hopper wall or bottom during the discharge of the contents of the hoisting device.

2. The combination of a hoisting device, a permanent hopper through which the hoisting device travels, having an outlet at one side of the line of travel of the hoisting device, and a hopper gate or gates which open to permit of the downward movement of the hoisting device through the hopper and which are closed when the hoisting device is in discharging position with relation to the hopper, as and for the purposes set forth.

3. A hoisting device, a stationary hopper in the line of its vertical travel, one or more parts of its wall in line with said travel, having an opening and closing movement to afford an opening for the passage of the hoisting device, and means connecting said section or sections with a part of the operative mechanism of the hoisting device whereby the movement of the hoisting device in one direction permits them to open and the movement of said hoisting device above the bottom of the hopper in a reverse direction causes them to be closed.

4. In a hoisting apparatus the combination of a hoisting-grab, means for closing and for opening it, and a stationary hopper having sides permanently connected together and an opening through which the grab may pass during its downward and upward movements through the hopper, and means actuated by the movement of the grab to close said opening when the grab is in a discharging position with respect to the hopper.

5. In a hoisting apparatus, a hoisting device adapted to be moved vertically, a hopper in the line of movement of the hoisting device having an opening through which said hoisting device is adapted to be moved, means such as gates for closing said opening when said hoisting device is in discharging position with respect to the hopper and automatic locks or latches for locking said gates in their closed position.

6. In a hoisting apparatus, a hoisting device adapted to have a vertical movement imparted to it, a hopper in line with the vertical travel of the hoisting device having an outlet at one side of said line and also adapted to provide an opening through which said hoisting device may pass, gates hinged to said hopper to close said opening, closing connections between said gates and the hoisting-rope of the hoisting device, and automatic latches for holding the gates in closed position connected with said hoisting device to be released thereby.

7. The hopper having an outlet at one side through which the contents are adapted to be discharged and an opening through its bottom,

and one or more gates for closing said opening attached to the hopper, and means for automatically opening the gates.

8. The hopper having an outlet at one side through which the contents are adapted to be discharged and an opening through its bottom, and one or more gates for closing said opening attached to the hopper, and means for automatically closing the gates.

9. The hopper having an outlet at one side through which the contents are adapted to be discharged and an opening through its bottom, and one or more gates for closing said opening attached to the hopper, means for automatically opening the gates and automatic latches for engaging the gates and holding the gates closed.

10. The hopper having an outlet at one side through which the contents are adapted to be discharged and an opening through its bottom, and one or more gates for closing said opening attached to the hopper, automatic means for closing the gates and automatic latches for engaging the gates and holding them closed.

11. The hopper having an outlet at one side through which its contents are adapted to be discharged and an opening through its bottom, and one or more gates for closing said opening attached to the hopper, automatic means for opening and closing the gates and automatic latches for holding the gates closed.

12. The combination of the hopper having a discharge-outlet at one side, an opening, gates closing the said opening arranged to swing sidewise, closing-arms mounted upon rock-shafts to close the gates, and means for turning the rock-shafts.

13. In a hoisting apparatus, a hopper having an outlet at one side, an opening in its bottom, gates for closing said opening hinged to the hopper, gate-closing arms mounted upon a rock-shaft, a rock-shaft arm for each rock-shaft, having lost motion thereon, and means for moving said arms at intervals.

14. In a hoisting apparatus, a hopper having an outlet at one side, a bottom having an opening, gates for closing said opening, a gate, latches suspended from the hopper having shoulders to engage the gate, means for holding them in automatic latching position, and automatic means for releasing the latches.

15. In a hoisting apparatus, a hopper having an opening in its bottom, one or more gates for closing the same, means for closing the gates, and two gate-latches one at each end thereof adapted to automatically engage the gate when closed, the said latches being connected with each other by a connecting-rod whereby their movements are caused to be simultaneous, an overbalance to hold the latches in engaging position and to return them to such position, and a push-rod to move the latches from engaging position with the gate to release the gate.

16. In a hoisting apparatus the combination

with a vertically-moving grab and means whereby said grab is hoisted and opened and closed, a stationary hopper one of its walls having an opening therethrough through
5 which said grab can ascend and descend, and means whereby said opening may be closed as and for the purposes set forth.

17. In a hoisting apparatus, the combination
with a vertically-moving grab and means
10 whereby said grab is hoisted and opened and closed, a permanent hopper one of the walls

of which has an opening through which said grab can ascend and descend, and means whereby said grab when in position above said opening will close said opening whereby
15 said hopper will be adapted to receive the contents of said grab.

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In presence of—

W. P. GARDNER,
A. WATSON.