

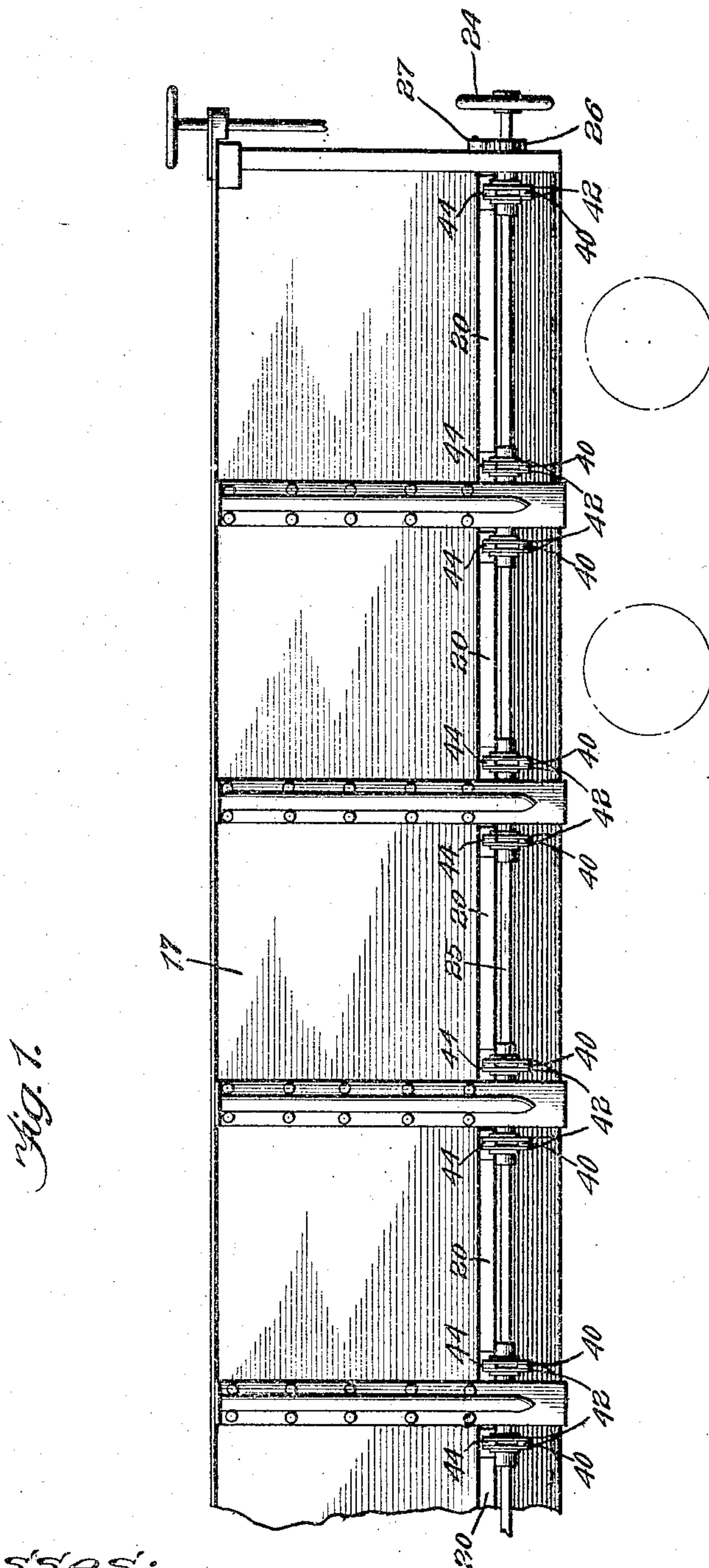
No. 883,933.

PATENTED APR. 7, 1908.

A. CAMPBELL.  
DOOR OPERATING MECHANISM.

APPLICATION FILED OCT. 28, 1907.

5 SHEETS—SHEET 1.



Witnesses:  
L. J. Christoffel

John McKeon Jr.

Inventor:  
Argyle Campbell.  
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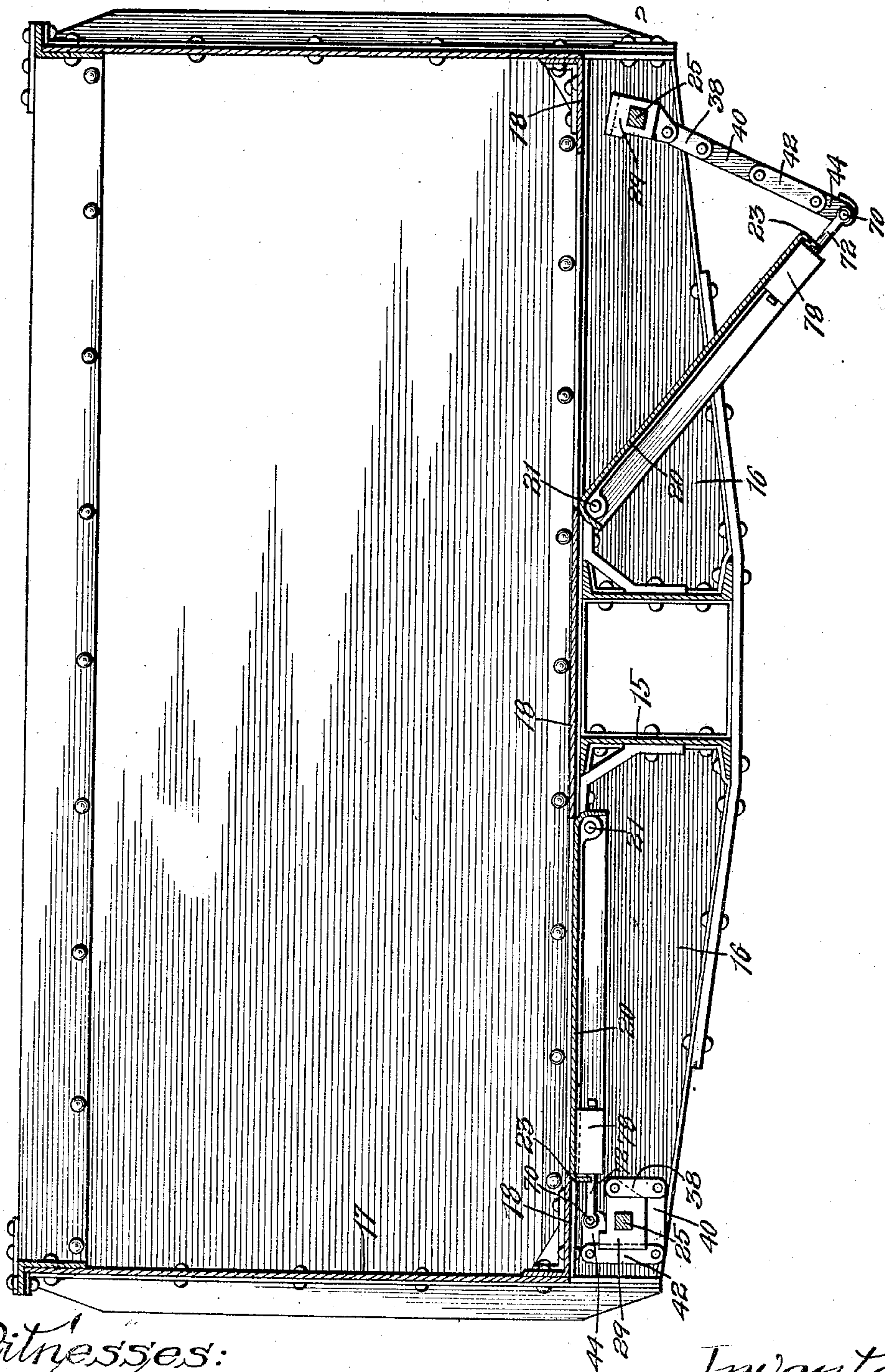
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5 SHEETS—SHEET 2.



Witnesses:

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Fig. 6.

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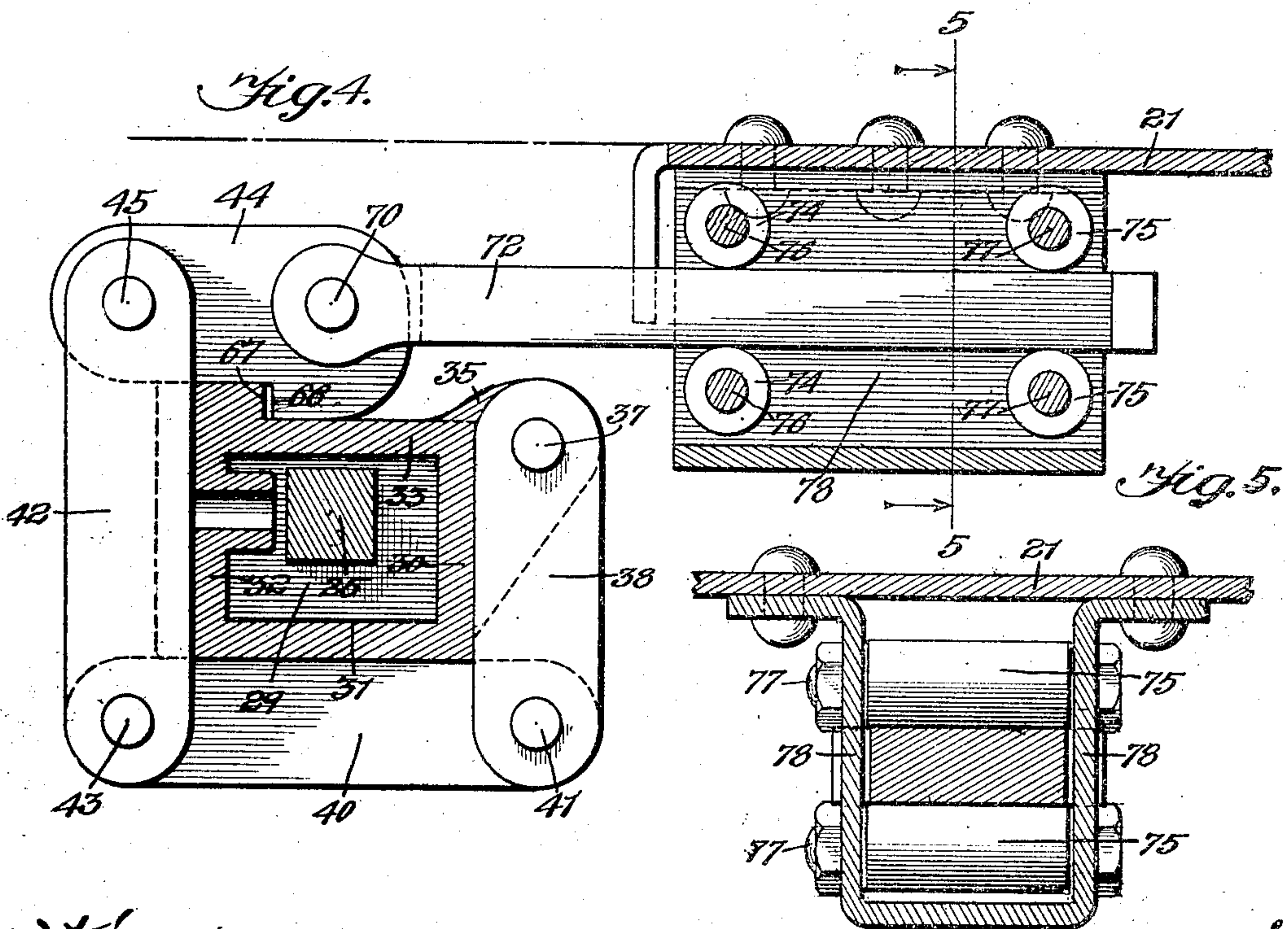
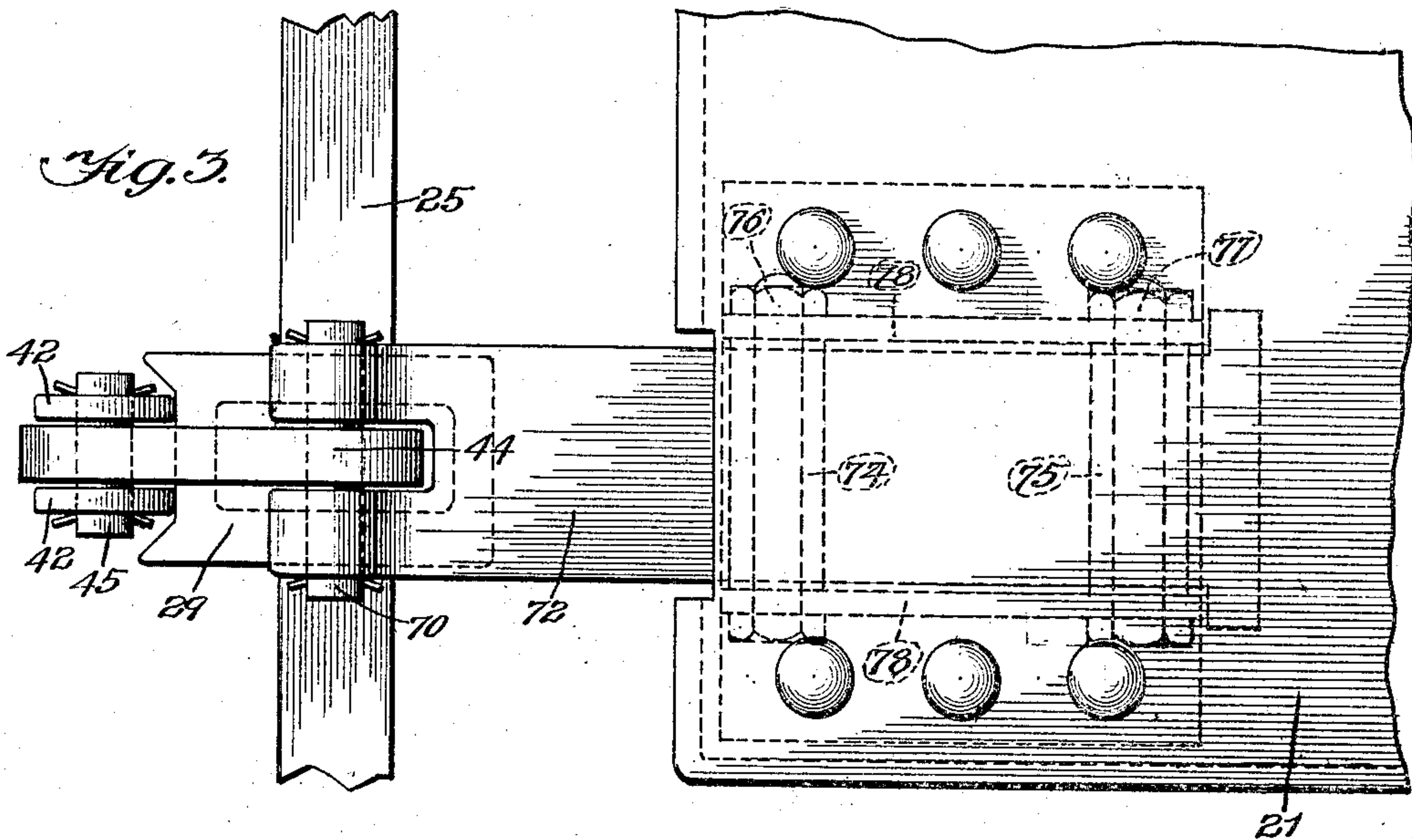
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5 SHEETS—SHEET 3.



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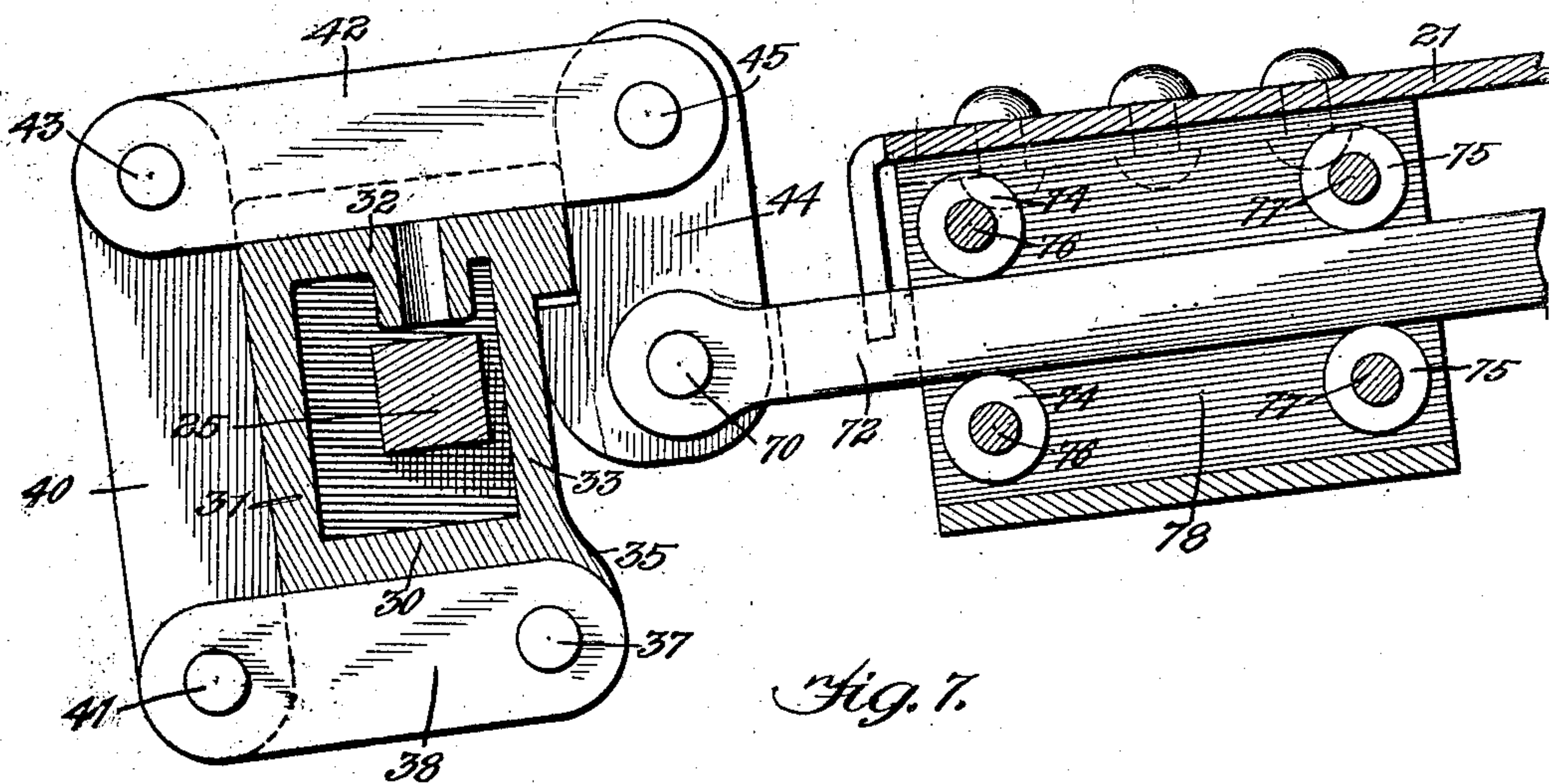
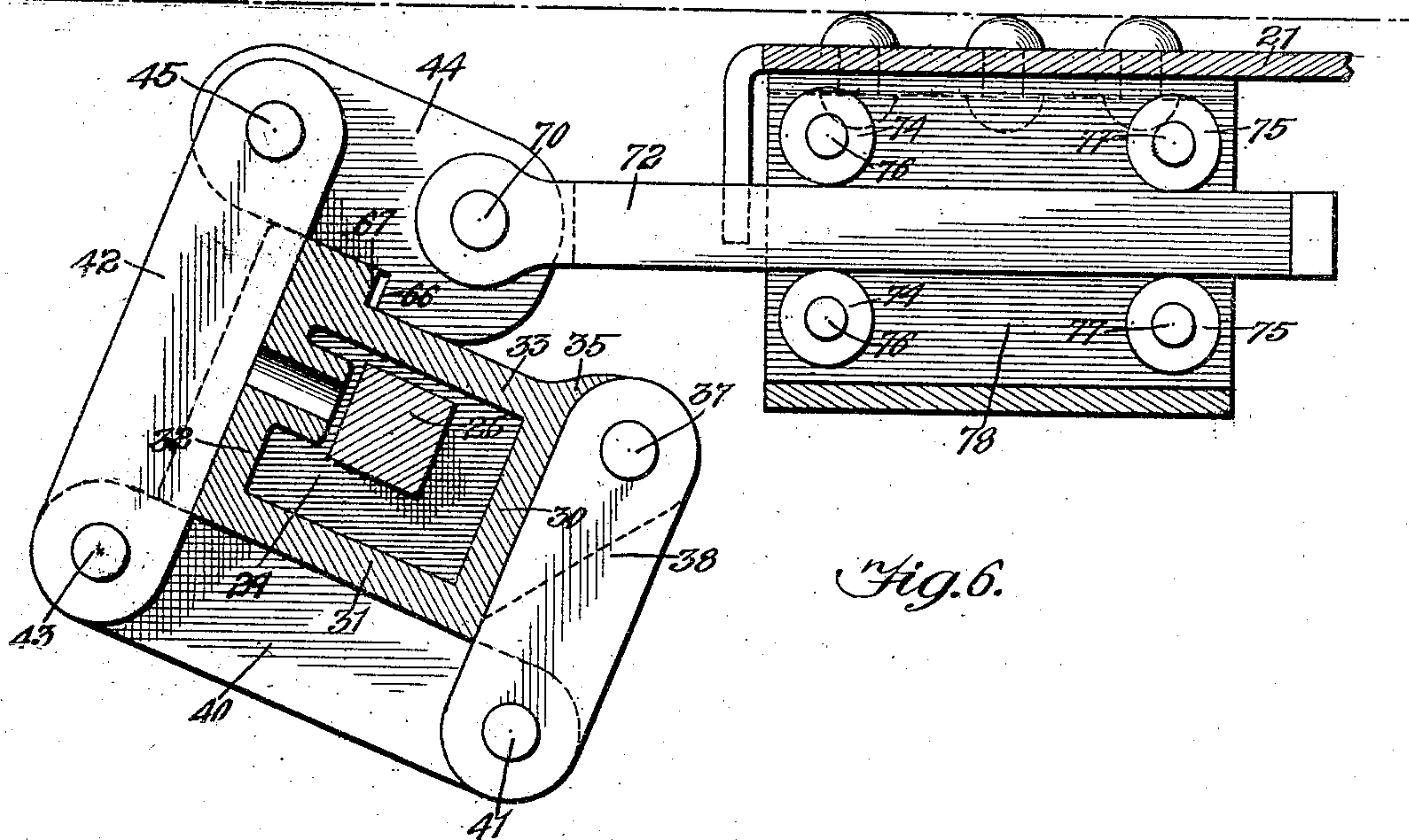
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5 SHEETS—SHEET 4.



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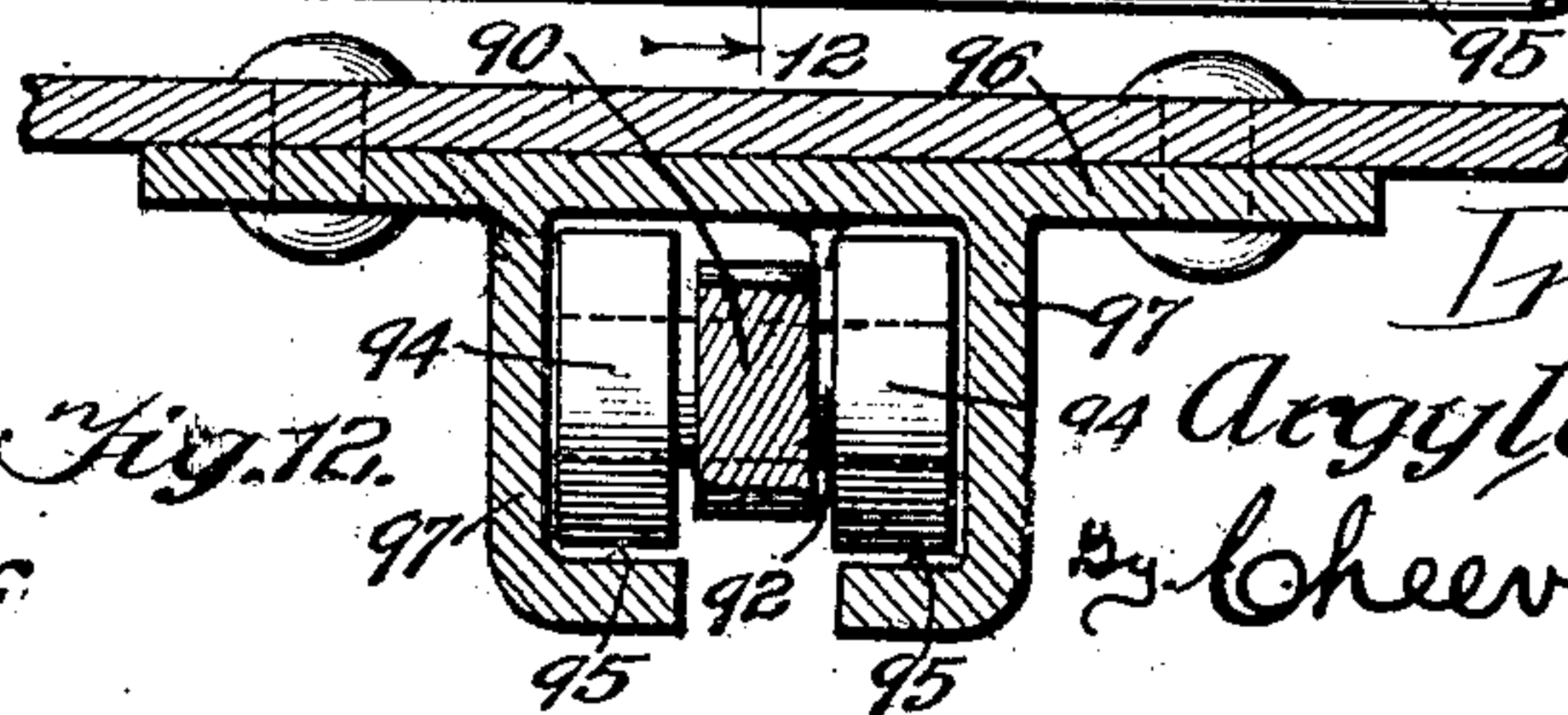
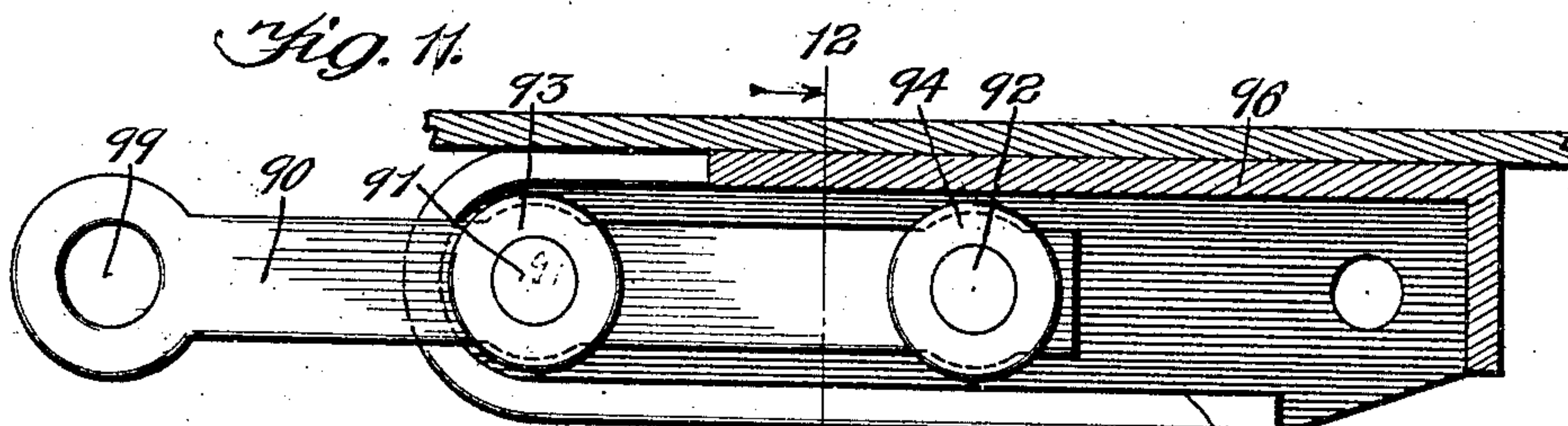
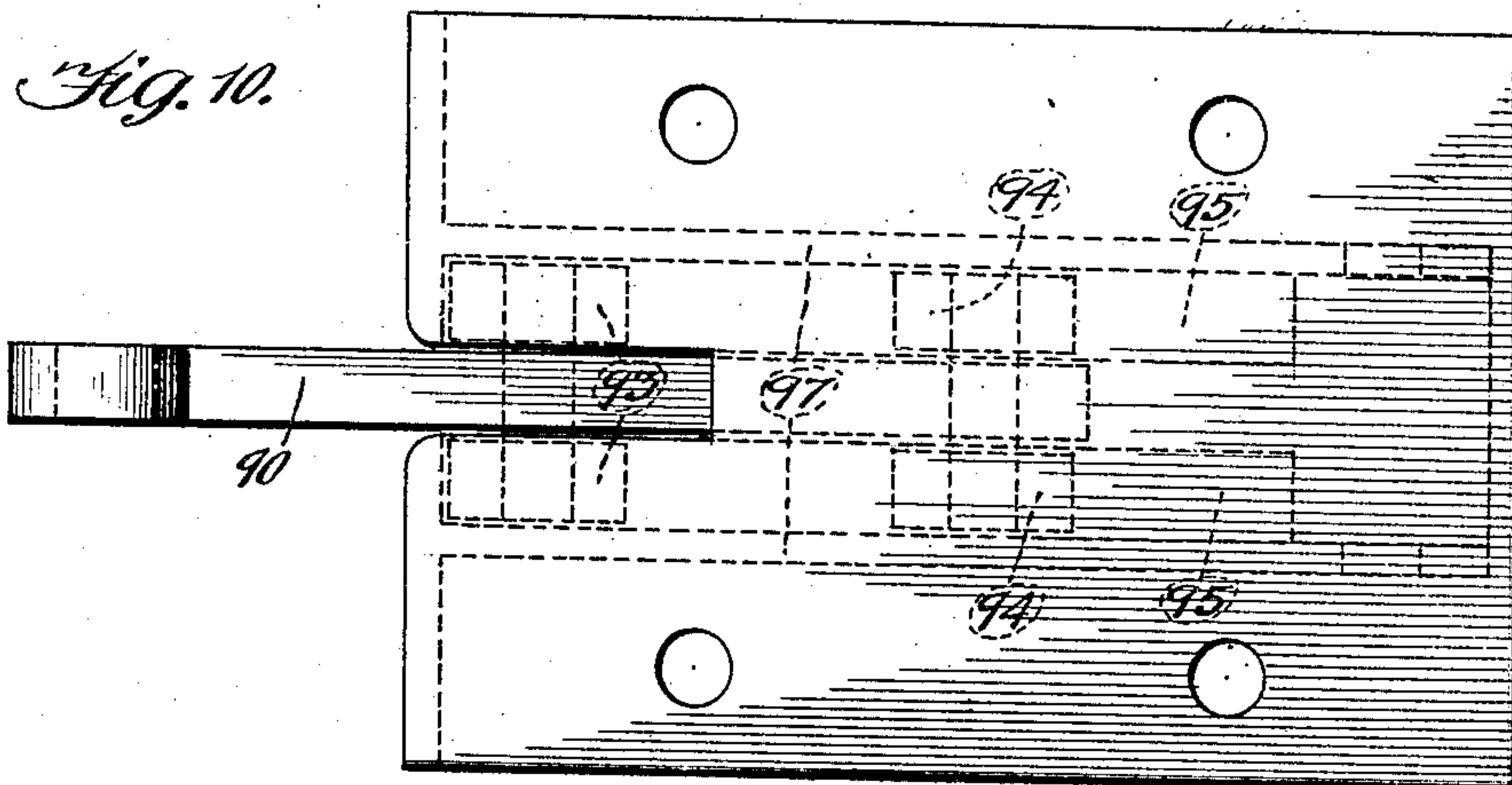
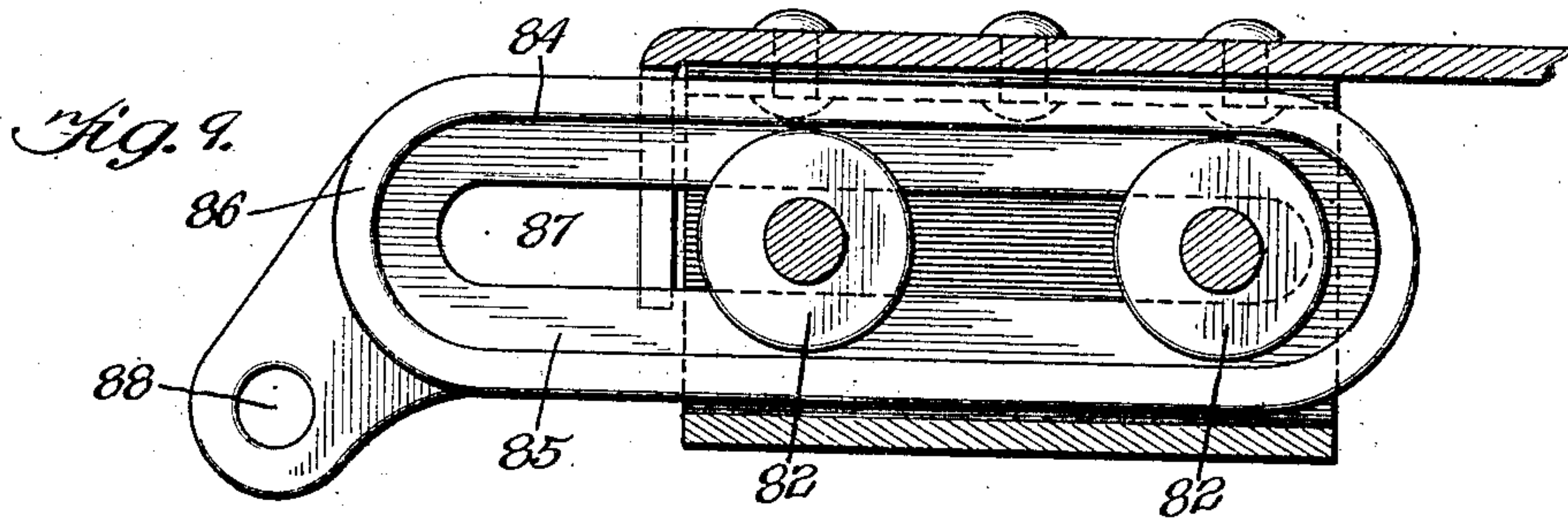
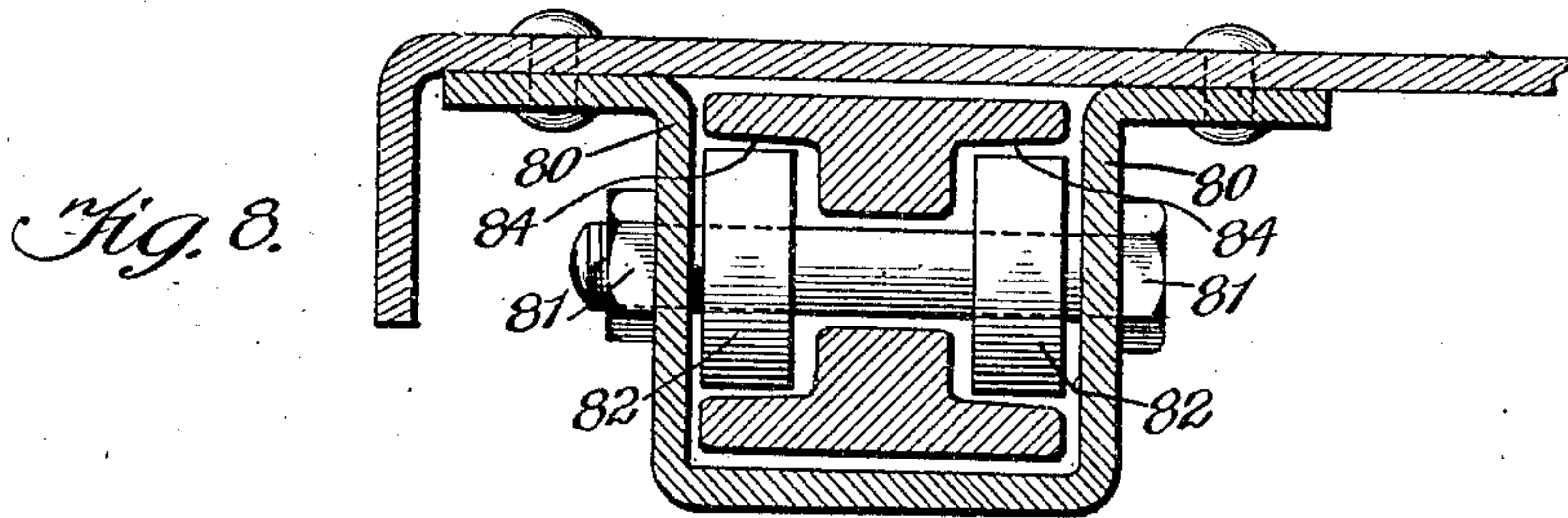
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5 SHEETS—SHEET 5.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

ARGYLE CAMPBELL, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE ENTERPRISE RAILWAY EQUIPMENT COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

## DOOR-OPERATING MECHANISM.

No. 883,933.

Specification of Letters Patent.

Patented April 7, 1908.

Application filed October 28, 1907. Serial No. 399,430.

*To all whom it may concern:*

Be it known that I, ARGYLE CAMPBELL, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Car-Door-Operating Mechanisms, of which the following is a specification.

This invention relates to dumping mechanisms for freight cars and its object is to provide means by which the load upon the floor of a car may be readily discharged and the door returned to closed position; to provide a mechanism by means of which the operating mechanism proper of the door performs the function of an efficient lock without the assistance of ratchet dogs or other similar locking mechanism.

A further object of the invention is to provide a convenient construction for the locking member proper.

The invention which is in many respects an improvement upon a modification of my United States Patent No. 812,783, consists in mechanism for accomplishing the foregoing objects and particularly in providing the door or doors constituting the bottom of a freight car floor with a locking latch or pin preferably approximately horizontal which is supported, when in locked position, directing upon the door operating means so that the load upon the door can not possibly tend to set the operating mechanism proper in motion or otherwise open the door.

More particularly it consists in having the pin engage the door in two points and the operating mechanism one point so that more stable equilibrium is maintained than in the structure shown in said prior patent.

It also consists in the combination with the foregoing of a door opening and closing mechanism which operates positively upon said pin in both directions and yet permits very wide opening of the load discharging floor door.

The invention consists in such a mechanism which can be easily made and installed which is efficient in operation and is not readily liable to get out of order.

The invention further consists in details of construction which will be hereafter more fully described and claimed as the specification proceeds.

Figure 1 is a side and Fig. 2 a sectional end

view of a freight car equipped with the device of this invention, the side of Fig. 2 showing the parts of the door in closed position, the right hand half of said figure showing the same parts with the door in open or discharging position. Fig. 3 is a plan and Fig. 4 a side enlarged detail view of the operating parts illustrated in the left half of Fig. 2. Fig. 5 is a sectional detail view on the line 5—5 of Fig. 4. Figs. 6 and 7 are views corresponding to Fig. 4 showing the successive positions of the parts there shown as the operation of opening the door is started. Fig. 8 is a vertical sectional and Fig. 9 a side sectional view of a modified form of construction of the latch pin and the box or housing in which it runs. Fig. 10 is a plan view, Fig. 11 a side sectional and Fig. 12 an end sectional detail view of another modified form of construction of the same parts. Fig. 12 is taken on the line 12—12 of Fig. 11.

As some concrete form for illustrating the invention must be adopted, the device of this invention is here shown applied to a car having a central girder 15, cross girders or bolsters 16, upright side members 17 and a floor proper 18 combined with horizontal load carrying floor doors 20 hinged at 21 to the central girder 18 in the manner well known in the art, but manifestly the device of this invention may be applied to load carrying doors however located in the car without departing from the spirit of this invention.

Extending along each side of the car under the floor 18 proper and adjacent to the swinging front edge 23 of the door or doors constituting the floor of the car is a shaft 25 adapted to be operated from the end of the car or any other convenient point by a suitable hand wheel 24 or any other suitable mechanism for rotating such a shaft in either direction. Each shaft is preferably provided with some sort of independent locking mechanism such as a ratchet wheel 26 and dog 27 at the end of the car but any other equivalent mechanism may be used, and one of the real purposes of this invention is to render the use of such a device entirely unnecessary.

Rigidly mounted upon each shaft 25 adjacent to each locking bolt or bar 72 which will be hereafter described is a suitable drum 29 of any convenient shape the form here



shown having four sides 30, 31, 32 and 33. At least one, and preferably two or more such drums with corresponding latch bolts or bars 72 are provided for each door. Extending from one side as 30 of each drum is a lug or crank arm 35. Through this crank arm formed by the drum 31 and this lug 35 is a short pin or stud 37 on which is journaled a link 38 adapted to normally fit in close contact with the side 30 of the drum 29 as shown. Along the side 31 of the drum is another link 40 journaled to the link 38 at 41. Along the side 32 of the drum is another link 42, journaled at 43 to the link 40. Along the side 43 of the drum is a link 44 journaled at 45 to the link 42. The links here mentioned may each be made from one, or a plurality of similar members placed side by side without departing from the spirit of this invention. The four link members just described constitute a connecting member between crank arm 35 and locking bar 72. The link 44 has in its side adjacent to the drum a notch or tooth 66 adapted to come in close proximity to but preferably slightly clear, a corresponding tooth or notch 67 cut in the face 33 of the drum so that the four link members described are prevented from traveling of their own weight or otherwise in a counterclockwise direction about the center of the shaft 25 and thus slip off from the drum and also so that when the shaft 25 is power driven in a clockwise direction it may force the link 44 to travel in a clockwise direction with the drum, until operated upon by external forces as hereafter described.

Journaled upon a bearing 70 in the link 44 in the same vertical plane as the center line of the shaft 25 is a locking pin or latch 72 extending beneath the car door 21 and bearing against the same or supported thereby at two suitable points such as by the rollers 74 and 75. It will be noted that this pin and the bearing in which it moves and all of the alternative constructions hereafter set forth constitute a pin and slot connection between the flexible link members 38, 40, 42 and 44 and the door exactly like the one of my said prior patent except as to details of form. In the construction shown in Figs. 3 and 4 this latch member 72 is a plain bar and the rollers 74 and 75 are ordinary rollers journaled on suitable supporting rods or shafts 76 and 77 mounted in suitable supporting members 78 secured by any suitable means upon the underside of the car door.

In Figs. 8 and 9 is shown a box or housing 80 containing pins or bolts 81 on which are journaled rollers 82. These rollers serve exactly the same purpose as the rollers 76 and 77 heretofore described but bear against the inner surfaces 84 and 85 formed in the latch or dog member 86 which is, as best shown in Fig. 9, formed with a slot 87 through which the shafts 81 pass. The hole 88 on this dog

member is adapted to fit upon the pin or other shaft member 70 heretofore described of the complete car mechanism.

In Figs. 10, 11 and 12 is shown another alternative form of locking dog or pin in which the car 90, corresponding to the members 86 and 72 heretofore described, carries rigidly, connected to it, shafts or studs 91 and 92 carrying rollers 93 and 94 which are adapted to travel upon tracks 95 or 96, as the case may be, inside of a housing 97 secured upon the underside of the floor door as shown. The pin 70 heretofore described passes through the hole 99 in the member 90 in exactly the same manner as through the member 72 shown in Fig. 4. Particular attention is here called to the fact that these locking members all bear at two points on the door and one on the operating shaft or mechanism and therefore there is perfect equilibrium when the door is closed and no tendency of the load to set the operating mechanism in operation while in my said prior patent a locking effect is only secured when the bearing on the door, the one adjacent to the shaft and the pivot point "27" are in the same vertical line, a condition hard to maintain without the aid of a supplemental locking mechanism which may be entirely dispensed with in the construction here shown.

In the operation of the device assume that the parts are in the position of the left portion of Fig. 2 and of Figs. 3 and 4. When now the operator desires to open the door he rotates the shaft 25 in a clockwise direction using any suitable mechanism heretofore referred to and thus moves the parts first to the position of Fig. 6, then to the position of Fig. 7 and finally to a position corresponding to that shown on the right side of Fig. 2. As the operator begins to rotate the shaft the angular tooth 67 engages the angular tooth 66 and consequently carries or moves the pin or latch 75 positively from the position of Fig. 4 to that of Fig. 6 notwithstanding the fact that the links 38—40—42 and 44 are flexible, with reference to each other, and are consequently incapable of exerting in themselves a direct compression strain to move the latch pin 72 inward with reference to the door. This positive rotating action also acts directly on the door to first overcome its inertia and second to overcome any sticking action. When the parts reach the position of Fig. 7 there is no longer any necessity for positive forcing action upon the pin 72 or upon the door proper and the link members 38—40—42—44 simply unwind from the drum 29 under the action of the weight upon the door until the parts reach the open position of Fig. 2, in which position any load upon the floor door is free to slide up at the side of the car. When the load has been discharged in the manner described the operator rotates the shaft 25 in the opposite or counterclockwise



direction with the result that he first restores the parts to the position of Fig. 7 then to that of Fig. 6 and finally to that of Figs. 3 and 4. During the passage from the position of Fig. 7 to that of Fig. 4 the mechanism draws the latch member 72 positively outward with reference to the door and into the position of Figs. 3 and 4 where as heretofore described it locks the door without exerting any pressure upon the operating mechanism tending to open the door. This same movement also positively forces the door into final closed position.

By this construction an exceedingly neat and compact form of device is obtained especially applicable to gondola cars but the device may be used on any form of car without departing from the spirit of the invention. It will also be noted that notwithstanding the fact that there is a flexible member in the combination the door is positively moved in each direction; in the opening direction as great a distance as is necessary to insure overcoming any sticking action of the closed door; and in the closing operation throughout the entire path of the travel of the door. Each of the alternative constructions for the locking pin are antifriction and are protected from dirt, ice and snow by the housings shown and heretofore described.

The claims are:

1. In combination with a car having a load retaining door, a latch member movably mounted on the door and a door operating mechanism located on the same side of the door as the latch and adjacent thereto connected to and operating said latch member and comprising a shaft and a link connection between the shaft and latch member operating and adapted to move the latch member in both directions.

2. In combination with a car having a load retaining door, a latch member movably mounted on the door and a door operating mechanism located on the same side of the door as the latch and adjacent thereto connected to the door through said latch mechanism, adapted to operate said latch in both directions and comprising a shaft and a link connection between the shaft and latch member operating and adapted to move the latch member in both directions.

3. In combination with a car having a load retaining door a latch engaging the door at two points and an outside support at one point and a door opening and closing mechanism located on the same side of the door as the latch and adjacent thereto connected to the door through said latch mechanism adapted to positively operate said latch in both directions and comprising a shaft and a link connection between the shaft and latch member operating and adapted to move the latch member in both directions.

4. In combination with a car having a load retaining door, a latch member movably mounted on the door, a door opening and closing mechanism located on the same side of the door as the latch and adjacent thereto connected to the door through the latch mechanism so constructed as to operate the latch in both directions and to positively move the door in each direction during at least a portion of its path of travel and comprising a shaft and a link connection between the shaft and latch member operating and adapted to move the latch member in both directions.

5. In combination with a car having a load retaining door, operating mechanism for positively opening and closing said door and a latch member movable by said operating mechanism located on the same side of the door as the latch and adjacent thereto so mounted that when the door is closed it engages both the door and operating mechanism without exerting any force to start the operating mechanism and comprising a shaft and a link connection between the shaft and latch member operating and adapted to move the latch member in both directions.

6. In combination with a car having a load retaining door, operating mechanism for positively opening and closing said door and a latch member movable by said operating mechanism so mounted that when the door is closed it supports the edge of the door upon the operating mechanism without exerting any force tending to start the operating mechanism, and operating mechanism comprising a shaft and a link connection between the shaft and latch member operating and adapted to move the latch member in both directions.

7. In combination with a car having a load retaining door, operating mechanism for positively opening and closing said door and a latch member connecting the operating mechanism to the door movable by said operating mechanism so mounted that when the door is closed it engages both the door and operating mechanism proper without tending to start the operating mechanism, and operating mechanism comprising a shaft and a link connection between the shaft and latch member operating and adapted to move the latch member in both directions.

8. In combination with a car having a load retaining door operating mechanism for positively opening and closing said door and a latch member connecting said operating mechanism proper to the door, movable by said operating mechanism, so mounted that when the door is closed it supports the adjacent edge of the door upon the operating mechanism without tending to start the operating mechanism, and operating mechanism comprising a shaft and a link connection



tion between the shaft and latch member operating and adapted to move the latch member in both directions.

9. In combination with a car having a hinged load retaining door, mechanism operated by compression to positively move said door in each direction, a latch member on the door resting, when in closed position, upon the operating mechanism without in that position tending to start the operating mechanism and a flexible connecting member attached to the operating member and to the latch and adapted to move the latch in both directions.

10. In mechanism of the class described in combination with a suitable supporting frame, a hinged car door to be moved between open and closed positions, a shaft pivotally mounted adjacent to but clear of a line of travel of an edge of the door, a crank arm on said shaft, a latch member on said door adapted when the door is closed to support the door upon said shaft, a flexible connecting member secured to said crank arm and to said latch member, in such a way that as the shaft is rotated in one direction it closes the door and moves said latch member into the position where it is supported by the shaft, said flexible connecting member also serving to move said latch member in the opposite direction when said shaft is reversed.

11. In mechanism of the class described in combination with a suitable supporting frame, a hinged car door to be moved between open and closed positions, a shaft pivotally mounted adjacent to but clear of the path of travel of a moving edge of the door, a crank arm on said shaft, a flexible connecting member attached to the crank arm and to the door whereby the shaft may move the door in one direction and mechanism actuated by the rotation of the shaft for positively moving the door in the opposite direction.

12. In mechanism of the class described in combination with a suitable supporting frame, a hinged car door to be moved between open and closed positions, a shaft pivotally mounted adjacent to but clear of the line of travel of the swinging front edge of the door, a crank arm on said shaft, a flexible connecting member attached to the crank arm and to the door whereby the shaft may move the door in one direction and mechanism actuated by the rotation of the shaft for positively moving the door in the opposite direction.

13. In mechanism of the class described in combination with a suitable supporting mechanism and a hinged car door to be opened and closed, a shaft mounted approximately parallel to the axis of the hinge of the door adjacent to and clear of the swinging front edge of the door, a crank arm on said

shaft, a flexible connecting member connected to the crank arm and the door whereby the shaft may move the door in one direction and mechanism actuated by the rotation of the shaft for positively moving the door in the opposite direction.

14. In mechanism of the class described in combination with suitable supporting mechanism and a hinged car door to be opened and closed, a shaft mounted approximately parallel to the axis of the hinge of the door adjacent to but clear of the front edge of the door, a crank arm upon said shaft, a latch upon the door engaging it at two points adapted to be moved to a position where it bears upon the shaft and thus supports the door in locked position, a connecting member secured to the crank arm and to the latch member, said flexible connecting member serving to positively force said latch member from locked position to a position in which the door may be opened as the shaft is rotated in proper direction for opening the door.

15. In mechanism of the class described in combination with a suitable supporting frame and a hinged door to be opened and closed, a shaft, a crank arm on said shaft, a flexible connecting member having one end connected to said crank arm extending around the shaft on its side away from the hinge of the door, a latch pin or locking member mounted on the door connected to the opposite end of said connecting member, said latch pin being adapted to be moved to a position in which it is supported upon the shaft for the purpose of locking the adjacent edge of the door, and mechanism by means of which rotating the shaft in either direction positively moves said latch and positively moves said door during at least a portion of the path of travel of the door.

16. In a car in combination with the under frame and a normally level pivoted floor door adapted to be opened and closed to discharge the load a shaft mounted below the floor of the car adjacent to the path of travel of the floor door a crank arm on said shaft and a connecting member of greater length than said crank arm connected at one end upon said crank arm and extending toward the door on the side of the shaft away from the hinge of the door a latch member on said door connected to said connecting member and mechanism for positively operating said latch and door in each direction during a portion of the path of the travel of the door.

17. In mechanism of the class described in combination with a frame and a load carrying floor door and means for operating the door; a latch member engaging the door at two points and engaging a fixed point of support outside the door, and means comprising a shaft and a link connection between said shaft and said latch member for automat-



ically moving said latch in opposite directions at opening and closing of the door.

18. In a car in combination with a suitable frame and load carrying door hinged thereto, a shaft adjacent to an edge of the door, a drum on the shaft, a crank arm on the drum, a flexible connecting member around the drum secured to said crank arm, a latch on the door connected to the connecting member, means for rotating the shaft in either direction, a tooth on the drum and an oppositely disposed tooth on the adjacent mechanism the whole arranged so that rotating the shaft moves the latch and door positively in either direction.

19. In a dump car, the combination with a load supporting door, a door supporting bar or latch projecting from the swinging edge of the door and movably connected therewith, a door supporting operating shaft having a polygonal drum adjacent to and clear of the path of the swinging edge of the door, and a plurality of hinged links fitting the faces of said polygonal drum and connecting said drum with said door supporting bar or latch, and adapted to move said bar or latch in both directions substantially as specified.

20. In a dump car, the combination with a load supporting door, a door supporting bar or latch projecting from the swinging edge of the door and movably connected therewith, a door supporting operating shaft having a polygonal drum adjacent to and clear of the path of the swinging edge of the door, and a plurality of hinged links fitting the faces of said polygonal drum and connecting said drum with said door supporting bar or latch, the outer end of said door supporting bar when the door is closed being directly over said operating shaft so that the load on the closed door has no tendency to turn the shaft in the direction for opening the door, substantially as specified.

21. In a dump car, the combination with a load supporting door, a door supporting bar or latch projecting from the swinging edge of the door and movably connected therewith, a door supporting operating shaft having a polygonal drum adjacent to and clear of the path of the swinging edge of the door, and a plurality of hinged links fitting the faces of said polygonal drum and connecting said drum with said door supporting bar or latch,

said door supporting bar having means for limiting its outward movement on the door.

22. In a dump car, the combination with a load supporting door, a door supporting bar or latch projecting from the swinging edge of the door and movably connected therewith, a door supporting operating shaft having a polygonal drum adjacent to and clear of the path of the swinging edge of the door, and a plurality of hinged links fitting the faces of said polygonal drum and connecting said drum with said door supporting bar or latch, the face of said drum which is uppermost when the door is closed and the one of said links which is hinged directly to said supporting bar having interengaging notches to cause said link to push the door supporting bar inward on the door when said shaft is turned to open the door, substantially as specified.

23. In a dump car, the combination with a hinged door, of a reciprocating supporting bar on its under side at the swinging edge of the door, of a door supporting and operating shaft adjacent to and clear of the path of the swinging edge of the door, a polygonal drum on said shaft, and a connection between said shaft and said reciprocating door supporting bar, the outer end of said supporting bar when the door is closed being directly above said operating shaft, substantially as specified.

24. In a dump car, the combination with a load supporting door, of an operating shaft and a polygonal drum thereon adjacent to and clear of the swinging edge of the door, a movable supporting bar or latch on the under side of the door projecting from its swinging edge, and a series of pivoted links corresponding in number to and fitting the sides of said polygonal drum and connecting said drum with said supporting bar, the pivot between said supporting bar and the link adjacent thereto being directly above said supporting shaft when the door is closed, substantially as specified.

In witness whereof, I have hereunto subscribed my name in the presence of two witnesses.

ARGYLE CAMPBELL.

Witnesses:

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C. J. CHRISTOFFEL.