

No. 679,475.

Patented July 30, 1901.

F. K. HOOVER & A. J. MASON.

EXCAVATING APPARATUS.

(Application filed Jan. 8, 1901.)

(No Model.)

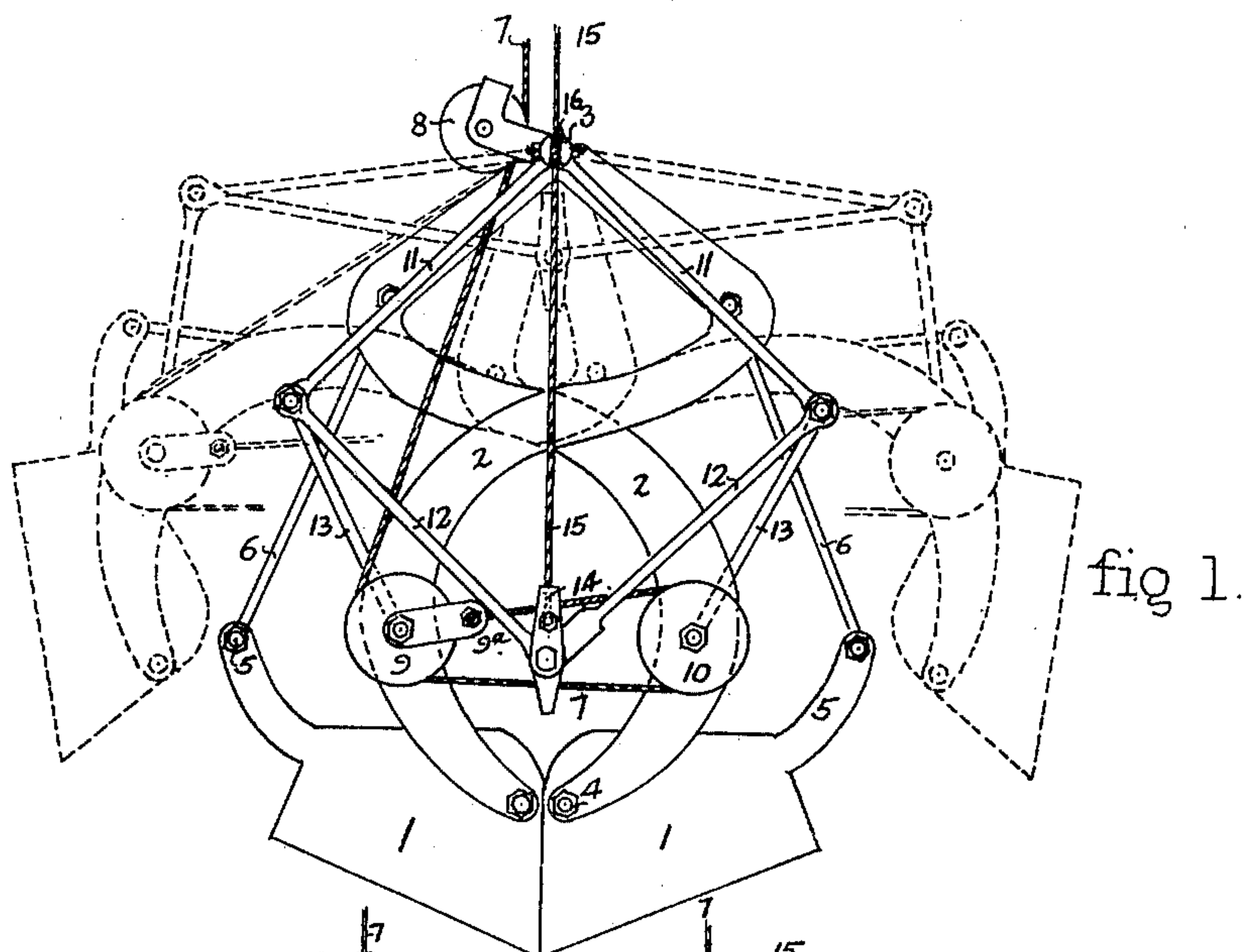


fig 1.

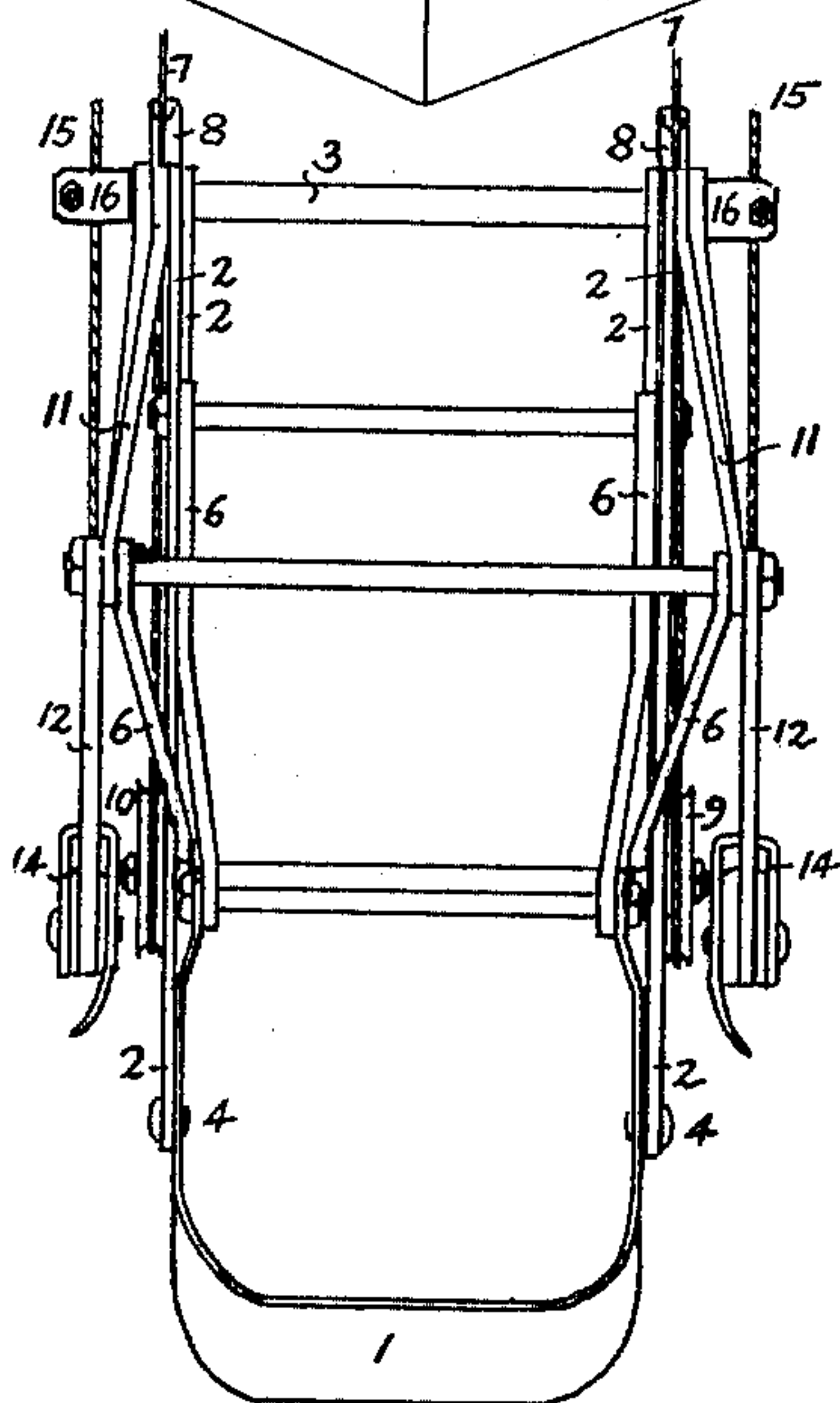


fig. 2

WITNESSES:

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# UNITED STATES PATENT OFFICE.

FRANK K. HOOVER AND ARTHUR J. MASON, OF KANSAS CITY, MISSOURI.

## EXCAVATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 679,475, dated July 30, 1901.

Application filed January 8, 1901. Serial No. 42,472. (No model.)

*To all whom it may concern:*

Be it known that we, FRANK K. HOOVER and ARTHUR J. MASON, citizens of the United States, residing at Kansas City, in the county of Jackson and State of Missouri, have invented certain new and useful Improvements in Excavating Apparatus, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

Our invention relates to improvements in excavating apparatus, having more particular reference to modifying and simplifying the construction of the apparatus set out in our application for Letters Patent, Serial No. 629,740, filed March 29, 1897. The apparatus embodying the construction set out in said application is perhaps the most nearly theoretically perfect, giving the best theoretical stroke and the best and most effective resolution of the forces on the opening and closing lines; but in practice, in the use of apparatus constructed upon a large scale, it was found desirable to limit the outside dimensions of the apparatus in order that it might pass through limited openings—as the hatchway of a vessel, to remove the cargo from the hold—or operate successfully in limited excavations or to dig steep slopes in excavations. To accomplish this, it has been found advisable to omit some of the parts which go to effect the theoretical stroke and to some extent modify and rearrange the remaining parts; and while by such modification and rearrangement a part of the force exerted by the closing lines is lost, so far as acting to close the trays, yet sufficient remains for practical operative purposes, and a simpler and more compact apparatus is obtained. To accomplish all of which, our invention consists of certain features of novelty hereinafter described, and pointed out in the claims.

Figure 1 represents a side elevation of the apparatus with the trays closed. Fig. 2 represents an end elevation of the same.

Similar numerals refer to similar parts throughout both views.

1 represents the trays.

2 represents the principal lever-arms pivotally mounted upon the central shaft 3 and

pivotally connected with the trays near their forward ends, as at 4.

5 represents arms formed integral with or secured upon the trays and forming a rearward extension thereof, and 6 represents auxiliary arms pivotally connected with the principal lever-arms and with the tray-arms 5.

It will be observed that the principal lever-arms 2 cross each other as a pair of shears, as in our former application, and that each tray is connected directly to the principal lever-arms 2 at its forward end and by the auxiliary arm 6 at the rear end to the opposing principal lever-arm 2. The object of this arrangement is to control both the front and rear end of the trays and to preserve and control the angle of inclination of the trays during the opening and closing strokes, as will appear.

The closing of the apparatus is effected by a cable 7, led around the sheaves 8, hung upon the central shaft 3, and around the sheaves 9 and 10, mounted upon the principal lever-arms at a short distance from the pivotal point of said arms upon the trays and attached to a becket 9<sup>a</sup>, associated with sheave 9.

The opening of the apparatus is effected by the oppositely-disposed toggles 11 12, pivotally connected at their outer ends, and opening-arms 13 connect the pivoted ends of the toggle-arms with the principal lever-arms, said opening-arms being preferably connected with the shaft by which the sheaves are mounted upon said principal lever-arms. The knee of one of said toggles is mounted upon the central shaft. At the knee of the opposing toggle is mounted a stirrup 14, to which is connected the opening-cable 15. Said cable passes through the head 16 upon the central shaft, so that when said toggles are drawn together the stirrup will come in contact with said head and check the toggles and prevent them coming so closely together as to form so acute an angle as to interfere with the closing stroke. Now it is manifest that as said toggles are drawn together and the arms extended by the action of the opening-arms 13 the trays will be drawn apart and opened, while during the opening movement by the action of the auxiliary arms 6 the trays will be held at a substantially constant angle of



inclination to the horizontal until near the end of the opening stroke, when said auxiliary arms will act to suddenly tilt the trays, and thus provide a very effective dump, the  
 5 action being in its main features substantially the same as in the apparatus of our former application, and at the beginning of the closing stroke said auxiliary arms will act to abruptly tilt the trays back to position for tak-  
 10 ing the load and retain them at a substantially constant angle of inclination to the horizontal during the closing stroke.

Having thus fully described our improvements, what we claim as our invention, and  
 15 desire to secure by Letters Patent, is—

1. In an excavating apparatus, the combination with the trays, the principal lever-arms hinged together and pivotally connected with the trays, and the auxiliary arms piv-  
 20 otally connected with the trays and with said principal lever-arms, of means for closing the trays, the same consisting of a closing-cable connected with one of said principal lever-arms and passing around suitable guides on  
 25 said lever-arms above the pivotal connections thereof with the trays and around a suitable guide located adjacent to the hinge of the principal lever-arms, substantially as set forth.

2. In an excavating apparatus, the combi-  
 30 nation with the trays and the principal lever-arms pivotally connected with the trays and with each other, of arms extending rearwardly from said trays, and auxiliary arms pivotally connected with said rearwardly-extending  
 35 tray-arms and with the opposite principal lever-arms, respectively, substantially as set forth.

3. In an excavating apparatus, the combination with the trays, the hinged principal  
 40 lever-arms pivotally connected with the trays, and the auxiliary arms pivotally connected with the trays and with said principal lever-arms and controlling the angle of inclination of the trays, of means for opening and dump-

ing, the same consisting of oppositely-dis- 45  
 posed pivotally-connected toggles, having one knee at the hinge of said principal lever-arms and arranged to effect the spread of the trays, a cable connected with the other knee, and  
 50 arms pivotally connected with the ends of said toggle-arms and with said principal lever-arms above the pivotal point thereof upon the trays, substantially as set forth.

4. In an excavating apparatus of the character described, means for opening the trays, 55  
 the same consisting of oppositely-disposed pivotally-connected toggles, having one knee mounted upon the central shaft of the appa-  
 60 ratus, a stirrup mounted at the other knee, and a cable connected with said stirrup and passing through an opening in said central shaft, substantially as and for the purpose set forth.

5. In an excavating apparatus, the combination with the trays, the principal lever-arms 65  
 pivotally connected with the trays, the auxiliary arms pivotally connected with the trays and with said principal lever-arms, oppositely-disposed pivotally-connected toggles having one knee at the hinge of said principal 70  
 lever-arms and arranged to effect the spread of the trays, a cable connected with the other knee, and arms pivotally connected with the ends of said toggle-arms and with said prin-  
 75 cipal lever-arms above the pivotal point thereof upon the trays of sheaves mounted upon said principal lever-arms above the pivotal point thereof upon the trays, a sheave mounted adjacent the hinge of said principal lever-  
 80 arms, and a closing and hoisting cable having its end connected with one of said principal lever-arms and passing around said sheaves, substantially as set forth.

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Witnesses:  
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