No. 780,872. PATENTED JAN. 24, 1905.

J. G. DELANEY.

ENGINE FOR OPERATING CLAM SHELL BUCKETS.

APPLICATION FILED JULY 30, 1903.

3 SHEETS—SHEET 1.

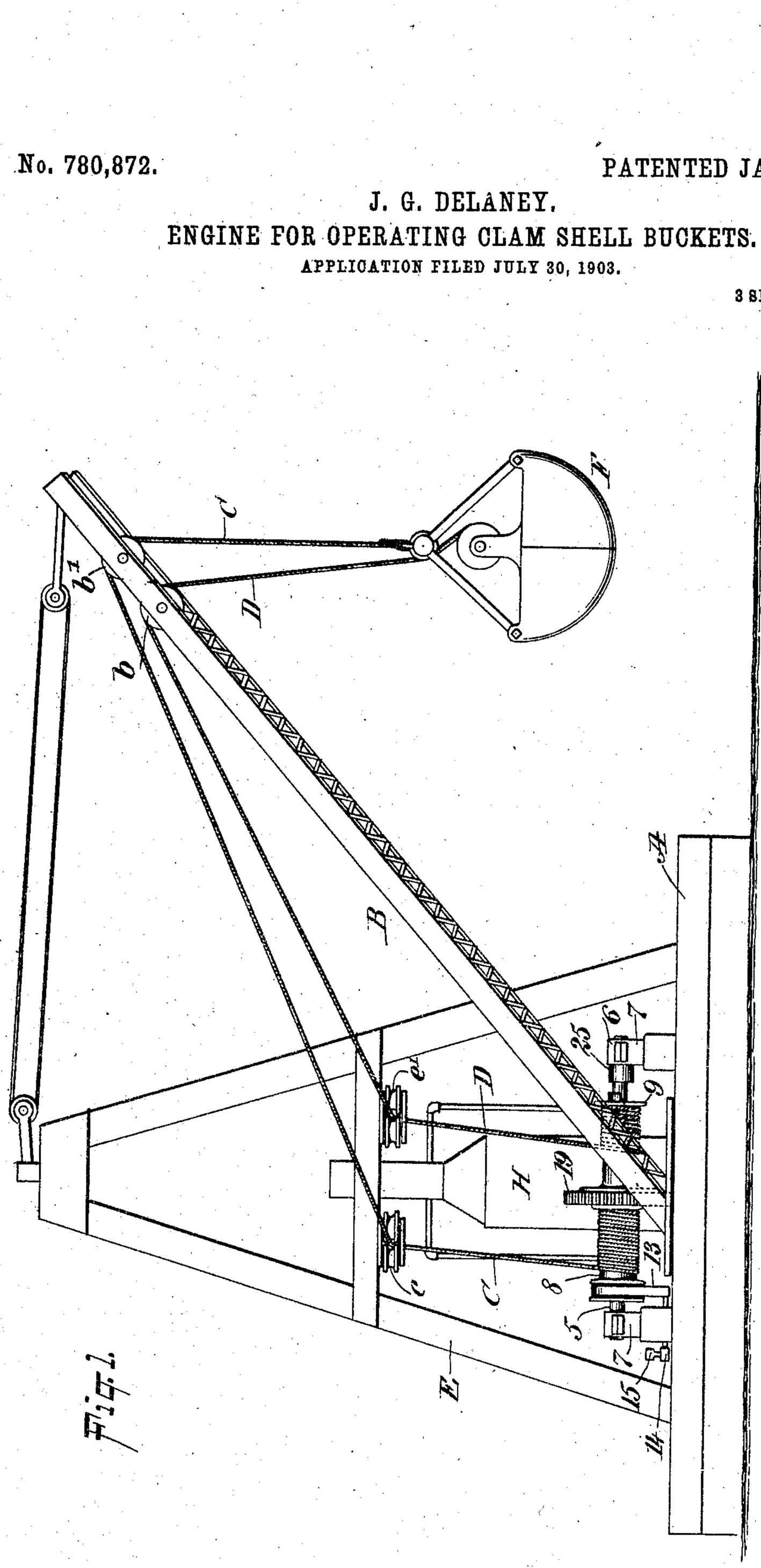


Fig. 1.

WITNESSES:

William P. Goebel.

H. J. Bernhoft

INVENTOR

James G. Delaney

BY Munn & Co

ATTORNEYS

No. 780,872. PATENTED JAN. 24, 1905.

J. G. DELANEY.

ENGINE FOR OPERATING CLAM SHELL BUCKETS.

APPLICATION FILED JULY 30, 1903.

3 SHEETS—SHEET 2.

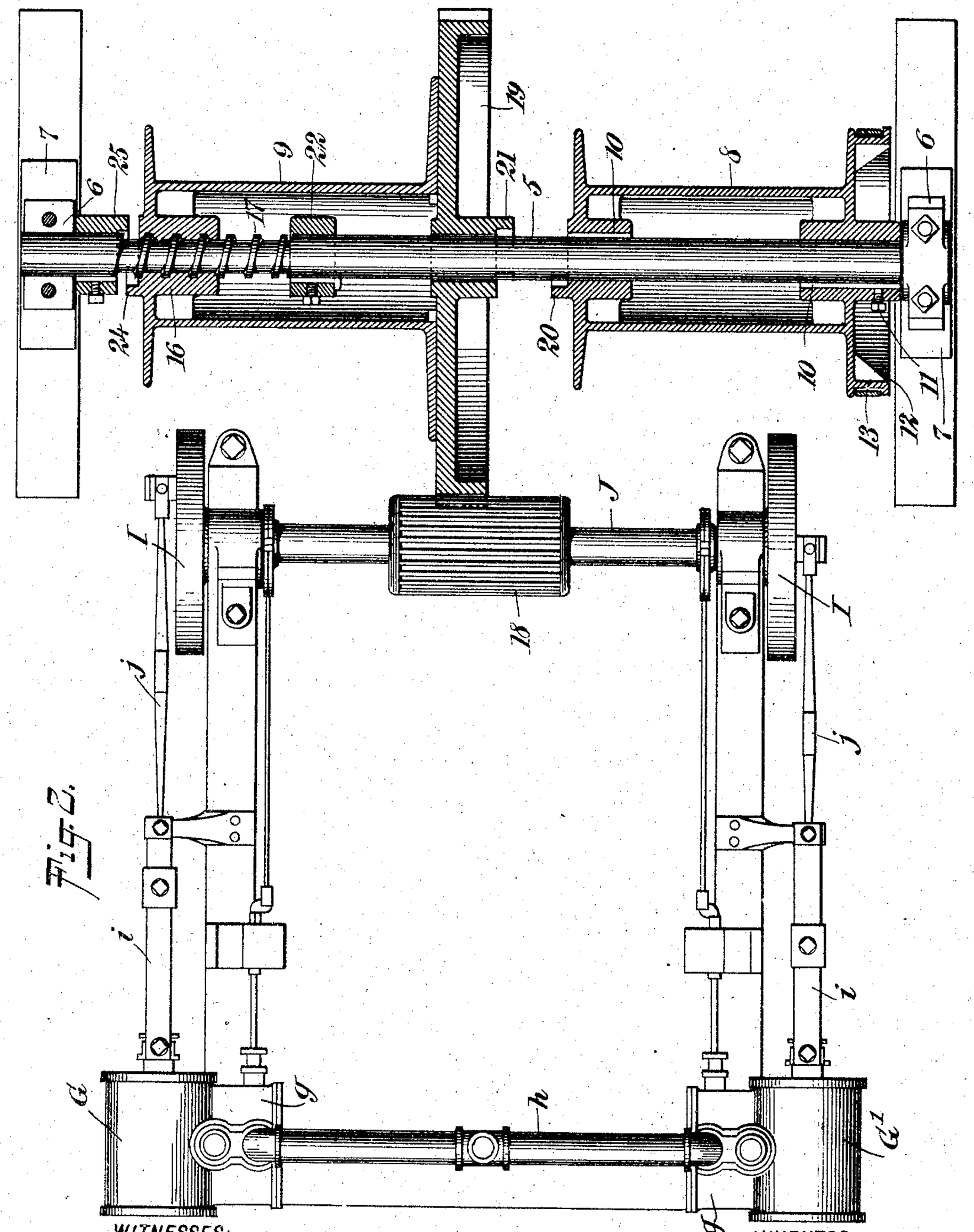


Fig. 2.

WITNESSES:

William P. Goebel.

H. J. Benhorst

INVENTOR

James G. Delaney

BY Munn & Co.

ATTORNEYS

No. 780,872. PATENTED JAN. 24, 1905.

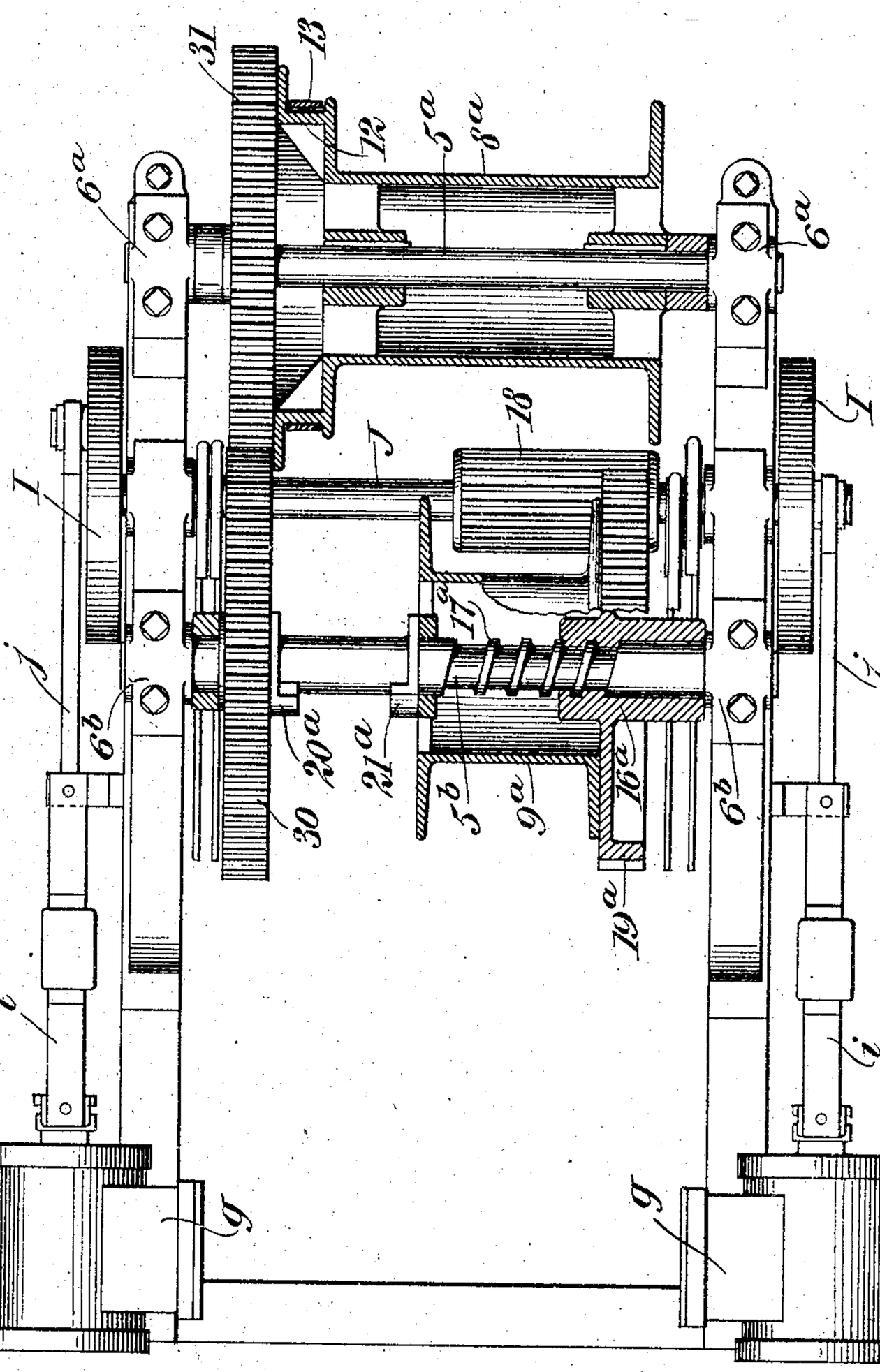
J. G. DELANEY.

ENGINE FOR OPERATING CLAM SHELL BUCKETS.

APPLICATION FILED JULY 30, 1903.

3 SHEETS—SHEET 3.

Fig. 3.



WITNESSES:

William P. Goebel.

H. J. Benckhoff

INVENTOR

James G. Delaney

BY Munn & Co.

ATTORNEYS

No. 780,872. Patented January 24, 1905.

UNITED STATES PATENT OFFICE.

JAMES GRANT DELANEY, OF NEWARK, NEW JERSEY.

ENGINE FOR OPERATING CLAM-SHELL BUCKETS.

SPECIFICATION forming part of Letters Patent No. 780,872, dated January 24, 1905.

Application filed July 30, 1903. Serial No. 167,569.

To all whom it may concern:

Be it known that I, JAMES GRANT DELANEY, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented a new and Improved Engine for Operating Clam-Shell Buckets, of which the following is a full, clear, and exact description.

My invention relates to an engine for operating clam-shell buckets, the same being applicable to machinery for dredging and for excavating purposes generally, although the invention in whole or in part may be used at will in the arts.

According to this invention the engine is equipped with two drums, usually mounted on a single shaft, one of said drums being capable of an endwise traversing movement toward and from the other drum by a screw-threaded connection with the shaft. This said drum is capable of two movements—*i. e.*, a rotary motion with the shaft and a traversing movement thereon—whereby the cable which opens and closes the members of the bucket may be coiled on or paid out from the drum by the rotary motion thereof, and said drum is adapted on the endwise movement thereof to be clutched fast with and to be disengaged from the other drum. In the embodiment of the invention to be hereinafter described in detail the cables for hoisting the bucket and for closing the members thereof are adapted to be wound separately on the non-traversing drum and the traversing drum, respectively, and these several parts are so combined and organized that the bucket-closing cable is coiled on the traversing drum during the period that the latter is rotating and moving endwise toward the non-traversing drum for the purpose of interlocking the two drums fast with one another by the time that the bucket is fully closed, after which the drums rotate as a unit with the shaft, so as to simultaneously coil the cables on the respective drums and elevate the loaded closed bucket preliminary to discharging the load therefrom. With the non-traversing drum is associated suitable means for locking it and the shaft against rotation at will, and on the shaft is a clutch member disposed for coöperation with the traversing drum when it reaches the limit of its movement away from the non-traversing drum, said clutch member making the traversing drum fast with the shaft for insuring rotation of the drum with the shaft on the uncoiling of the bucket-operating cable to open the bucket and lower it for resuming the work of dredging or excavating.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is an elevation of my improved engine for operating clam-shell buckets applied to a common type of dredging-machine, showing the boom and the bucket swung around to a position preliminary to discharging the load. Fig. 2 is a plan view of the engine, illustrating my improvements in horizontal section; and Fig. 3 is a sectional plan view of another embodiment of my invention, wherein the bucket-hoisting drum and the bucket-closing drum are mounted on different shafts and are adapted for operation in identically the same way as the engine shown by Figs. 1 and 2.

A designates an ordinary dredge, on which is mounted the usual boom B, the latter being equipped with suitable sheaves *b b'*, over which run the cables C D. An upright frame E on the dredge is equipped with suitable guide-sheaves *e e'* for the purpose of guiding the cables C D to the drums of the improved compound engine to be presently described. The cable C is hitched or connected in any suitable way to a means for suspending the clam-shell bucket, (indicated in its entirety at F,) said cable serving as the means for hoisting said bucket. The other cable D is associated with means for opening and closing the members of the clam-shell bucket; but as said means for operating the bucket are well known to those skilled in the art I have not considered it necessary to particularly illustrate and describe the same. For the purpose of distinguishing the cables I will hereinafter refer to the cable C as the bucket-hoisting cable, while the cable D will be designated as the bucket-operating cable, it being under-

stood that the function of the cable D is to positively open and close the members of said bucket.

The engine to which I have applied my invention is shown by Fig. 2 of the drawings as having cylinders G G', which are provided with the usual valve-boxes *g*, to which the motive fluid is adapted to be conveyed from a boiler H by means of a feed-pipe *h*. The cylinders accommodate pistons which are connected operatively with the pitmen *i*, which are associated with suitable cross-heads having link connections *j* with wrist-pins on the crank-disks I, the latter being provided on end portions of the engine-shaft J. This engine-shaft is equipped with means for operating the controlling-valves which are adapted to play in the valve-boxes *g*. The engine as thus far described is similar to the ordinary type of reciprocating engines, and it need not be further described.

5 designates a drum-shaft which is journaled in appropriate bearings 6, provided on short posts 7, which are secured to the dredge in positions for the shaft 5 to lie adjacent to and parallel with the engine-shaft J. This shaft 5 carries two drums 8 9, on which are adapted to be coiled the cables C D, respectively. The drum 8 for the operation of the bucket-hoisting cable C is adapted to be made fast with the shaft 5 in any suitable way, such, for example, as by the employment of keys 10, which may be engaged by set-screws 11. Said bucket-hoisting drum is mounted on the shaft to remain in a predetermined position thereon and to rotate therewith at all times, the drum 8 being non-traversing with respect to the shaft. This drum is provided at or near one end portion with a brake member 12, the same consisting of an annular brake-surface bounded by suitable flanges, although the specific type of brake-surface may be varied within wide limits. A movable brake member is associated with the brake-surface of the bucket-hoisting drum 8, and in the embodiment of the invention shown by the drawings the movable brake member is in the form of a band 13, arranged to encompass the brake-surface 12, one end of said band being anchored at a suitable fixed point and the end thereof being connected with a suitable rock or operating shaft 14, having a lever or treadle 15 for the purpose of contracting the band and tightening the same frictionally on the brake-surface of said drum 8. It is to be understood, however, that I do not confine myself to any particular style of brake mechanism nor to any particular embodiment of means for arresting the rotation of the drum 8 and the shaft 5 on which said drum is mounted.

One of the important features of my invention consists in the employment of a bucket-operating drum 9, having a traversing movement on the shaft 5 and with respect to the drum 8. This drum 9 is represented as having a nut 16 made fast therewith, and in Fig. 2 the nut is in one piece with an end portion of the drum. The shaft 5 is provided with a male screw-thread 17 for a part of its length, and the nut 16 of the drum 9 has a female threaded passage, the threads of which are adapted to have engagement with the thread 17 of said shaft 5, whereby the drum 9 has threaded engagement with the shaft for the purpose of screwing back and forth thereon.

With the drum 9 is associated means for rotating the same at any point of its traverse on the shaft 5, and one embodiment of means for securing this end consists in the employment of a driving-gear 18 on the engine-shaft J and a driven gear 19 on the traversing drum 9. The driving-gear 18 is represented as an elongated toothed pinion occupying a substantially central position on the engine-shaft, to which it is made fast in any suitable way. The driven gear 19 is secured to or made integral with an end portion of the traversing bucket-operating drum 9, and this gear has intermeshing engagement with the driving-gear 18 at all points of its traversing or shiftable movement with said drum 9.

Another important feature of my invention consists in the employment of devices whereby the drums 8 9 are adapted to be made fast with the shaft 5 for the purpose of rotating simultaneously therewith at the limit of the traversing movement of the drum 9 in one direction. As shown by the drawings, the non-traversing drum 8 is provided at its end opposite the brake with a clutch member 20 of any suitable construction. The drum 9 or the driven gear 19 is provided with a complemental clutch member 21, which is disposed in facing relation to the clutch member 20 for the purpose of coöperating therewith and making the drums 8 9 fast with one another. In Fig. 2 of the drawings the drums 8 9 are shown as being spaced or separated one from the other and along the shaft 5; but when the drum 9 is rotated by the gears 18 19 the nut 16 follows the thread 17 on the shaft 5, which remains at rest, thereby imparting the traversing movement in one direction to the drum 9 and making the clutch member 21 approach the clutch member 20 of the drum 8, whereby the two clutch members engage or interlock positively one with the other on the completion of the traversing movement of said drum 9. The drums are thus interlocked or clutched for rotation simultaneously or as a unit, and the gears 18 19 thus operate to transmit the motion from the engine-shaft J to both of the drums 8 9 and the shaft 5. The rotation of the engine-shaft J in an opposite direction, however, will impart movement in a reverse direction to the drum 9, because the nut 16 will screw the drum in a backward direction, thus unclutching the drum 9 from the drum 8 and allowing the two drums to be operated independently. The movement of the drum 9 in a direction to-

ward the other drum 8 is arrested by the engagement of the clutch members 20 21 and by the impingement of the nut 16 against a stop-collar 22, which is made fast with the shaft 5 at a point adjacent to the threaded portion 17 of said shaft. Said drum 9 is also provided at its end opposite to the driven gear 19 with a clutch member 24, the latter being adapted for interlocking engagement with a clutch member 25, which is secured rigidly in a suitable way to the drum-shaft 5 at a point adjacent to one of the journal-bearings 6. This clutch member 24, which travels with the drum 9, is adapted to engage with the clutch 25 when said drum 9 reaches the limit of its traversing movement in a direction away from the drum 8, and the described construction allows the drum 9 to be made fast directly with the shaft 5 when it is uncoupled or disengaged from the bucket-hoisting drum. It will be understood that during the traversing movement of the drum 9 with respect to the shaft and the bucket-hoisting drum said shaft should remain in a stationary position or at rest in order that the threaded nut 16 may serve its function in imparting the traversing movement to the bucket-operating drum. The brake mechanism serves as a convenient means for holding the shaft at rest, and said brake mechanism also serves to lock the shaft and the drum 8 against rotation when the loaded bucket shall have been raised and during the period that the boom is undergoing the lateral swinging operation for the purpose of moving the bucket to and from the unloading or discharging point.

The operation may be described briefly as follows: Assuming that the bucket is in its lowered and opened position, the gears 18 19 are driven from the engine-shaft to impart the traversing movement to the drum 9 and toward the drum 8, the shaft 5 being at rest. The combined rotary and traversing movement of the drum 9 operates to coil the cable D thereon for the purpose of closing the members of the bucket and for the further purpose of making the clutch member 21 engage with the clutch member 20 by the time that the bucket members are completely closed, whereby the two drums are clutched or coupled for rotation simultaneously. The continued rotation of the drums 8 9 by the motion of the engine-shaft transmitted through the gears 18 19 operates to coil the cables C D uniformly on the drums 8 9, and the bucket F is thus kept in its closed position by the strain on the cable D and is hoisted by the operation of the cable C, the brake mechanism being released. After the bucket shall have been raised to the desired position the brake can be applied in order to lock the drum 8 against rotation, and the boom B, with the loaded bucket, can then be swung laterally or to any desired point, as represented by Fig. 1, for the purpose of discharging the load. While the brake remains applied to the drum 8 the engine can be reversed in order that the gears 18 19 and the nut 16 may impart the traversing movement to the drum 9 in an opposite or backward direction, thus allowing the cable D to be uncoiled for the purpose of opening the bucket. When the drum 9 and the clutch member 24 approach the clutch member 25 so that the parts will have mutual engagement, the drum 9 is made fast with the shaft through the coöperating clutch members, thus making said drum 9 rotate with the shaft and the drum 8 in the operation of uncoiling the two cables C D during the lowering movement of the bucket F to resume the dredging or excavating operations.

I do not desire to confine myself to the employment of a single driving-shaft, and to the arrangement of the bucket-hoisting drum and the bucket-closing drum on said single shaft, because I am aware that the arrangement of these parts may be modified within the skill of the constructor, an example of which is shown by Fig. 3 of the drawings. In this figure the frame or bed of the engine is provided with two sets of shaft-bearings, (indicated at 6^a and 6^b.) In the bearing 6^a is mounted a shaft 5^a, adapted to support the bucket-hoisting drum 8^a, the latter being non-slidable on said shaft 5^a and adapted to receive the cable which operates to raise the bucket. This drum 8^a is provided at one end with a rotary brake member 12, adapted to be engaged by the movable brake member 13, as heretofore described. In the other set of bearings, 6^b, is mounted another shaft, 5^b, the latter having a threaded portion 17^a for a part of its length. On this shaft 5^b is mounted a revoluble and traversing drum 9^a, adapted to receive the cable which operates to close the members of the bucket. The traversing drum 9^a is provided with a nut 16^a, having threaded engagement with the shaft 5^b, and this drum is also equipped with the gear 19^a and with the clutch member 21^a. The gear 19^a has intermeshing and traveling engagement with the master gear-pinion 18 on the engine-shaft J, and the clutch member 21^a is adapted to engage with another clutch member, 20^a, when the traversing drum reaches the limit of its movement in one direction. This last-named clutch member 20^a corresponds to the clutch member 20 on the non-traversing drum 8 of the engine shown by Figs. 1 and 2; but in this embodiment of the invention the clutch member 20^a is associated with a train of gears adapted to operatively connect the drums 8^a 9^a at the completion of the traversing movement of the drum 9^a.

The construction shown by Fig. 3 contemplates the employment of two drums 8^a 9^a, mounted on independent shafts which are arranged in parallel relation on the respective

sides of the engine-shaft J, thus producing a compact and simple form of engine. The clutch member 20^a is rigid with a gear 30, which is idly or loosely mounted on the shaft 5^b, the said gear having direct intermeshing engagement with another gear, 31, which is fast with the non-traversing drum 8^a and is disposed to rotate therewith on the shaft 5^a. It will be understood that the traversing drum 9^a has threaded engagement with the shaft 5^b and that its gear 19^a meshes with the gear 18, so that the drum 9^a will be driven from the engine-shaft J. When the drum is rotated for the purpose of coiling the bucket-closing cable thereon, the nut 16^a meshes with the threaded portion 17^a of the shaft 5^b, so that the drum is capable of a combined rotary and traversing movement until it reaches the limit of said movement in one direction, whereupon the clutch member 21^a engages the clutch member 20^a, at which time the drum ceases to have the traversing movement on the shaft, although it is capable of continued rotation, whereby the drum 9^a through the clutches 21^a and 20^a serves to drive the gears 30 31 and make the drum 8^a rotate at the same time that the drum 9^a is driven. This operation causes the two drums to rotate as a unit for the purpose of coiling the hoisting-cable on the drum 8^a and of keeping the bucket-operating cable in a taut condition on the drum 9^a, the operation of the parts shown by Fig. 3 being similar in substantial respects to the operation of the engine shown by Figs. 1 and 2.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. An engine of the class described, having a shaft, a drum having a threaded connection with the shaft and movable endwise thereon, a driving-gear, and a driven gear revoluble and shiftable with the drum and having shiftable intermeshing relation to said driving-gear.

2. An engine of the class described, having a shaft, a revoluble traversing drum screwed thereon, a brake mechanism controllable at will for holding the shaft at rest, and means for rotating the drum.

3. An engine of the class described, having a shaft, a drum fast therewith, a traversing drum having a threaded connection with the shaft and shiftable relatively to the other drum, and means for coupling the drums.

4. An engine of the class described, having a shaft, two drums thereon, one of said drums having a threaded connection with the shaft, and a coupling for making the two drums rotate with the shaft as one drum reaches the limit of its traversing movement.

5. An engine of the class described, having a drum for receiving a bucket-hoisting cable, a traversing drum for a bucket-operating cable, and means for insuring joint rotation of the drums as the drum for the bucket-operating cable reaches the limit of its traversing movement.

6. An engine of the class described, having a drum for a bucket-hoisting cable, another drum for a bucket-operating cable, means for imparting a traversing movement to the last-mentioned drum, and means for making the traversing drum revoluble with the first drum as it reaches the limit of traversing movement.

7. An engine of the class described, having a drum for a bucket-hoisting cable, another drum for a bucket-operating cable, means for imparting traversing movement to the last-mentioned drum, means for rotating the drums, and a clutch device for coupling the drums for simultaneous rotation.

8. An engine of the class described, having a drum for a bucket-hoisting cable, another drum for a bucket-operating cable, means for imparting traversing movement to the last-mentioned drum, means for locking the first drum at will, and means for insuring the simultaneous rotation of the drums when the traversing drum reaches the limit of the movement.

9. An engine of the class described, having a shaft, a drum for a bucket-hoisting cable and fast with said shaft, a traversing drum for a bucket-operating cable and having threaded connection with the shaft, and means for insuring simultaneous rotation of both drums as the traversing drum reaches the limit of its traversing movement on the shaft.

10. An engine of the class described, having a bucket-hoisting drum, a traversing bucket-operating drum shiftable into and out of interlocking relation with the first drum, and means for locking the first drum against rotation.

11. An engine of the class described, having a shaft, a bucket-hoisting drum fast therewith, means for locking said shaft at rest, a traversing bucket-operating drum having a threaded connection with the shaft, means for clutching the traversing drum to the first-mentioned drum, and means for making the traversing drum fast with the shaft.

12. An engine of the class described, having a shaft, a bucket-hoisting drum fast therewith, a traversing bucket-operating drum having a threaded connection with the shaft, a clutch device for making the traversing drum fast with the bucket-hoisting drum, and means for rotating the traversing drum during its endwise movement along the shaft.

13. In mechanism of the class described in combination, a shaft, a drum rigid therewith, a second drum which may rotate upon said shaft, a collar rigid with said shaft remote from said first drum and constituting a clutch member, said second drum constituting a clutch member coöperating with said first clutch member, said drums constituting clutch

members coöperating with each other, and automatic means for shifting said second drum longitudinally.

14. In mechanism of the class described in combination, a drum, a second drum adjacent thereto and longitudinally-movable clutches for connecting said drums to rotate together, said clutches being closed by the longitudinal movement of said second drum, a screw for advancing said second drum, a gear-wheel rigid with said second drum, and an elongated pinion meshing therewith and driving the same.

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

JAMES GRANT DELANEY.

Witnesses:

JNO. M. RITTER,

C. E. HOLSKE.