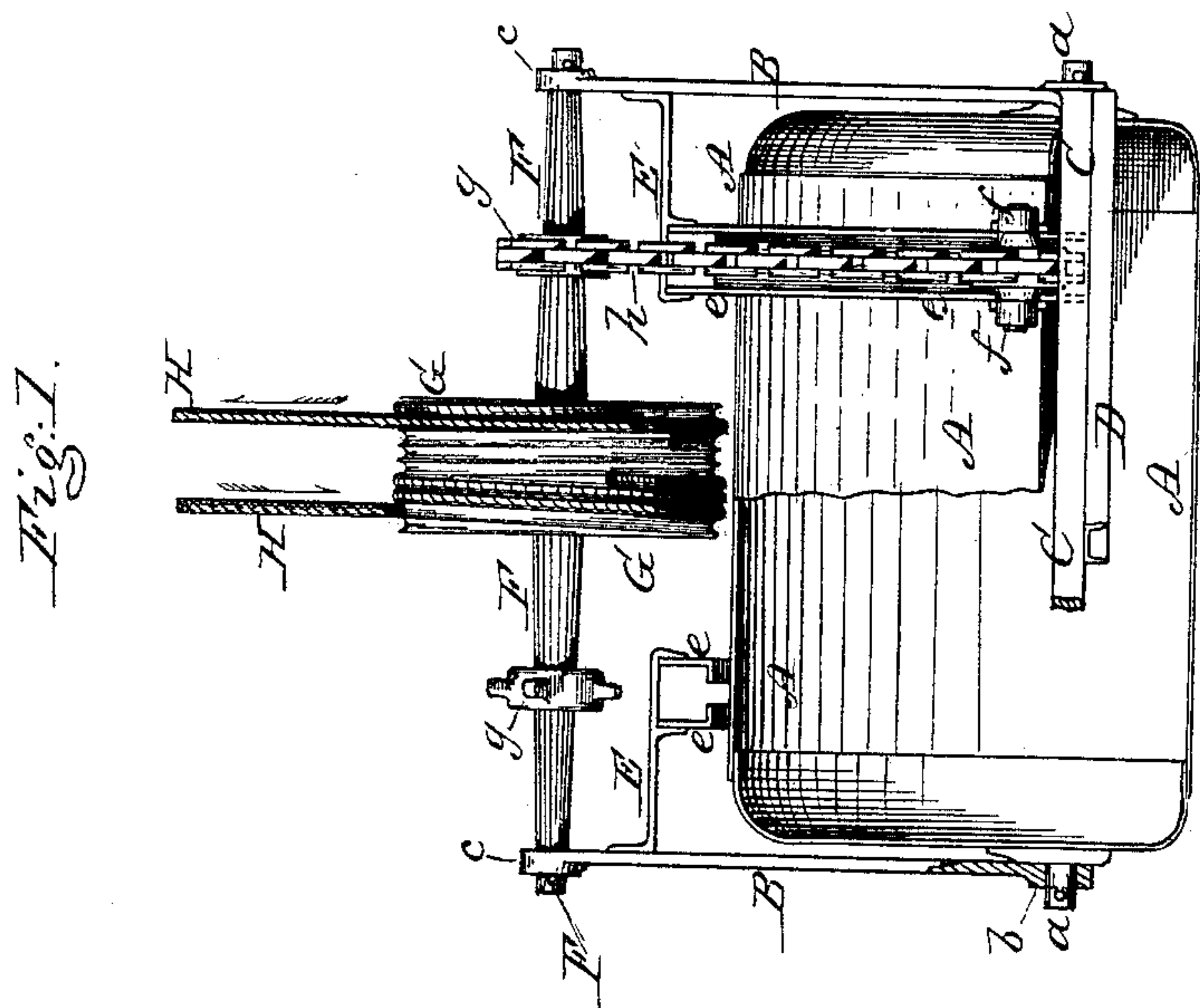
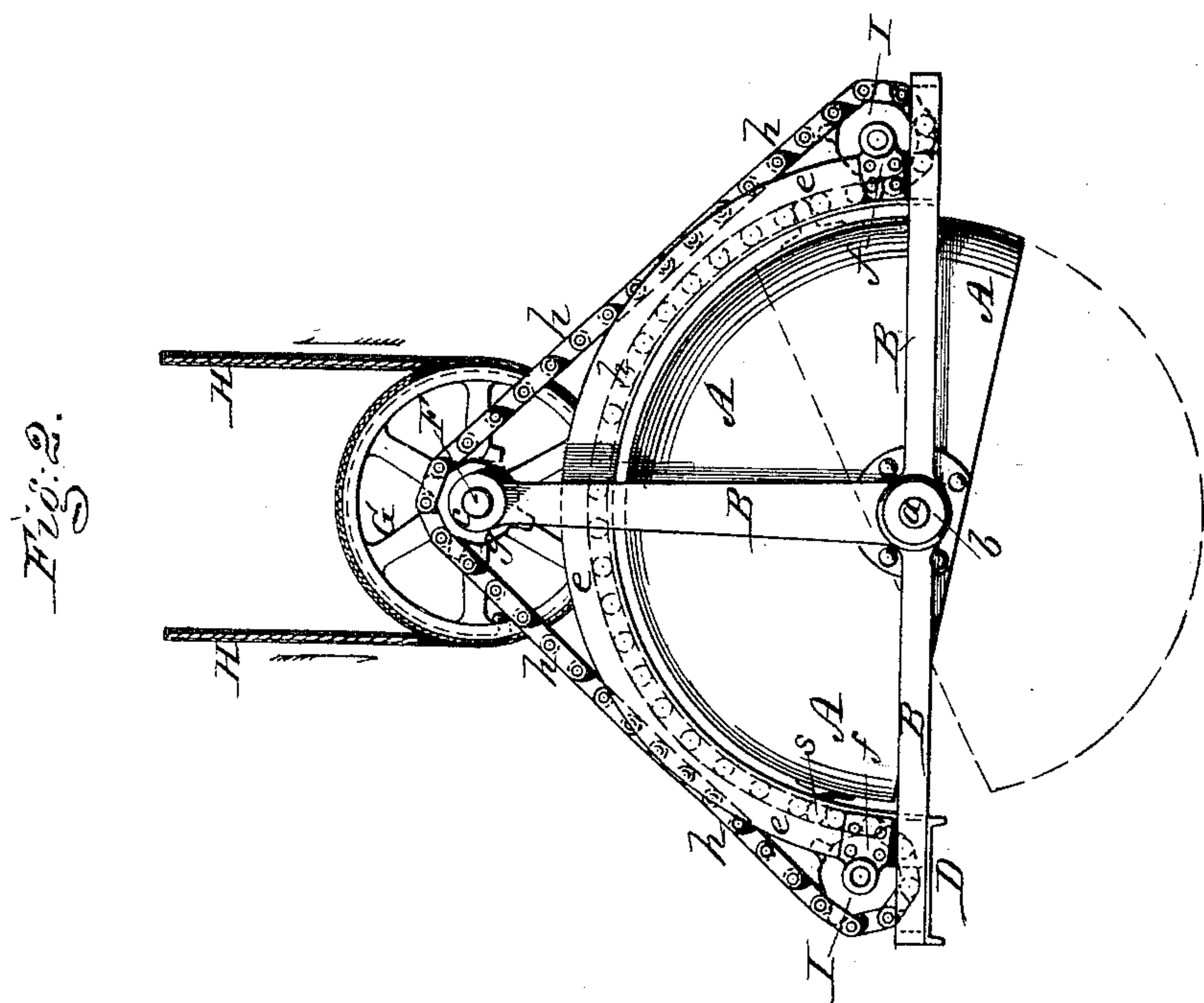


No. 407,162.

Patented July 16, 1889.



Witnesses

H. A. Hansen.

A. M. Williamson

Inventor

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By

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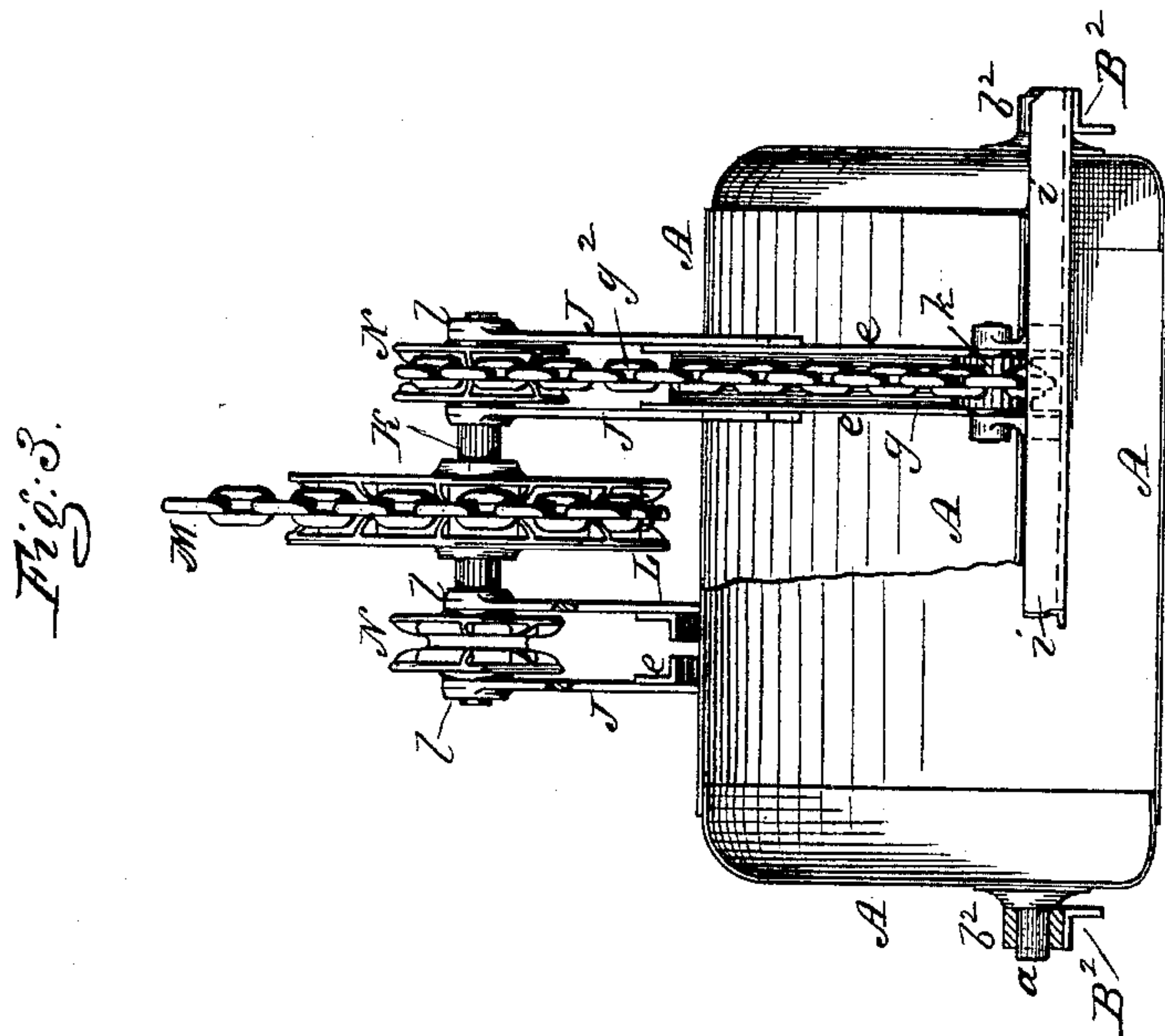
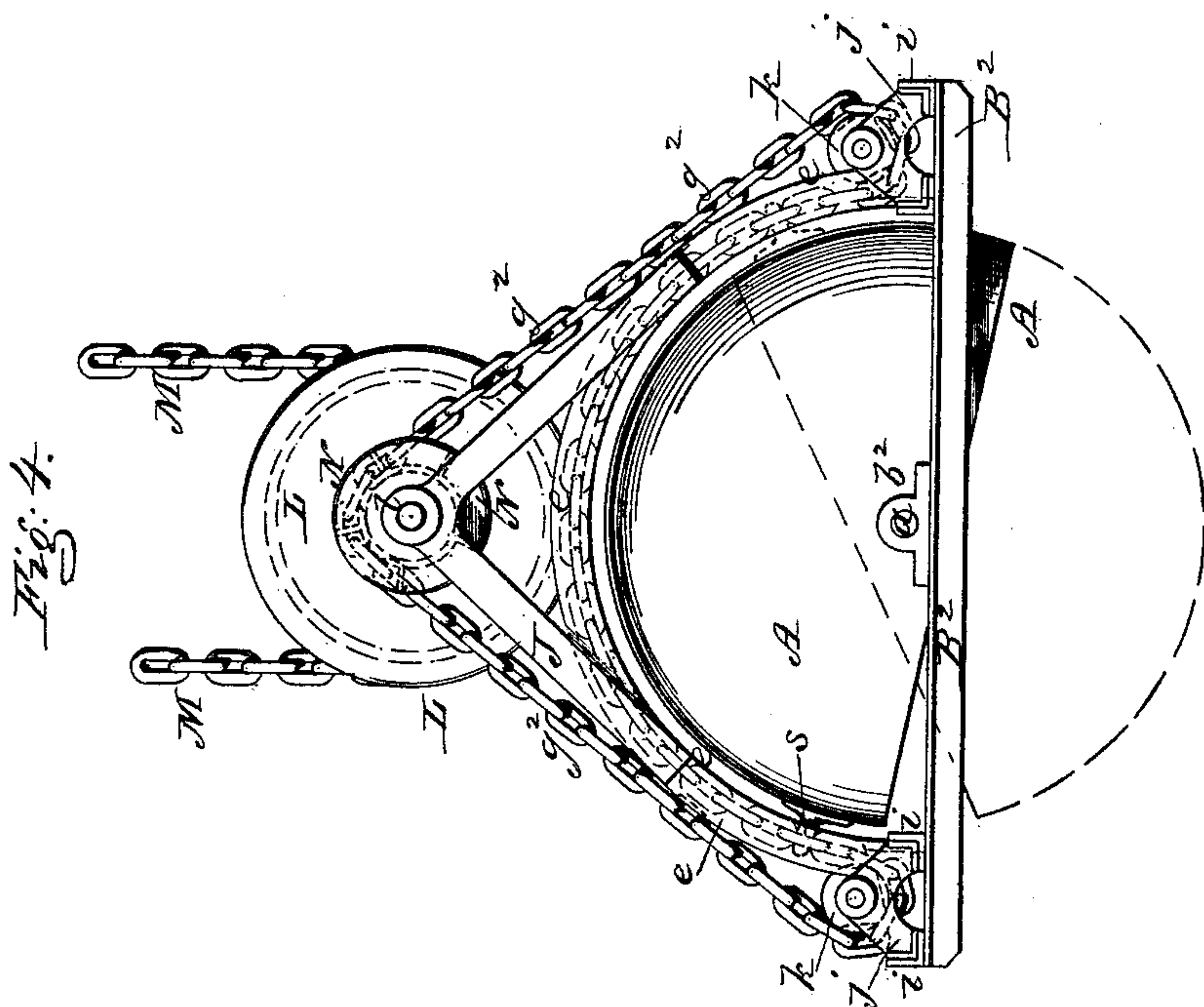
(No Model.)

2 Sheets—Sheet 2.

A. E. BROWN.  
GRAB BUCKET.

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# UNITED STATES PATENT OFFICE.

ALEXANDER E. BROWN, OF CLEVELAND, OHIO.

## GRAB-BUCKET.

SPECIFICATION forming part of Letters Patent No. 407,162, dated July 16, 1889.

Application filed March 13, 1889. Serial No. 303,115. (No model.)

*To all whom it may concern:*

Be it known that I, ALEXANDER E. BROWN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Grab-Buckets or Coal-Scoops; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this application.

My invention relates to a novel device or contrivance for picking up coal and other materials or substance for the purpose of elevating, conveying, and redepositing the same after the well-known fashion of "handling" coal, ores, and other materials.

Previous to my invention all of the devices or contrivances which have been made for this purpose and adapted to work automatically in picking up, carrying off, and dumping the material have been constructed upon the principle of what is commonly known as a "grab-bucket"—that is, with two hinged bucket-like receptacles adapted to be turned with their working-edges together for the purpose of grasping or gripping a given quantity of the material, which would then be elevated in the closed duplex bucket-like device, carried off to any requisite destination, and discharged by a reverse or opening movement of the parts of the grab-bucket. In all contrivances constructed upon this principle serious practical difficulties have been met with in the working of the same, among which may be mentioned, first, the great strength or weight in the parts of the bucket and other portions of the contrivance and the immense amount of power necessary to force into and together the working-edges of the parts of the bucket in gathering up the material, and, second, the unavoidable tendency to crush or break and thus injuriously affect the coal and such other materials as require to be handled with the least possible amount of breakage in the necessary operation of forcing together against the intermediate particles of the material the opposing edges of the duplex bucket. I propose to provide for use a device which shall not only be free from these and other serious objections to which the usual form of grab-bucket is subject, but which shall also

be more efficient in its operation, simpler and more durable in its construction, and will require less power for its successful working.

To these main ends and objects my invention may be said to consist, primarily, in a device or contrivance for scooping up coal and other materials for subsequent elevation and translation, comprising a single receptacle-like device, made, preferably, in a semi-cylindrical form and adapted to oscillate about an axis of motion in such manner that when placed with its mouth or opening in contact with the surface of the material to be operated upon, and then partially rotated upon its axis of motion, part of the perimeter of its mouth or opening will simply be forced to penetrate downwardly into and thence upwardly out of the material, (somewhat after the fashion of a hand-scoop,) whereby the material will be accumulated within the said scoop-like bucket, in which it may be subsequently retained for conveyance to some requisite point, all as will be hereinafter more fully explained; and my invention may be said to further consist in certain combinations of devices by which a scoop-like bucket constructed and operating upon the principle just described may be operated, all as will be hereinafter more fully explained.

To enable those skilled in the art to which my invention relates to make and use a device or contrivance embracing my improvement, I will now proceed to more fully explain my invention, referring by letters to the accompanying drawings, which form part of this specification, and in which I have shown the said invention carried out in those forms in which I have so far successfully practiced it, although other forms or modifications of the invention may of course be adopted without materially changing the character of my improvement.

In the drawings, Figure 1 is a side view (with a portion of the receptacle broken away) of so much of an apparatus or contrivance for picking up and elevating and conveying coal as it is necessary to show for the purpose of fully illustrating the nature of my invention. Fig. 2 is an end view of the contrivance shown in side view at Fig. 1. Fig. 3 is a view similar to Fig. 1, but showing a slight



modification in the construction of the apparatus; and Fig. 4 is an end view of the devices shown in side elevation at Fig. 3.

In the several views the same parts, wherever they occur, will be found designated by the same letters of reference; but as the details of construction vary somewhat between the form of contrivance shown at Figs. 1 and 2 and that illustrated at Figs. 3 and 4, I will first fully describe the apparatus seen at the first-mentioned two figures, and will then briefly explain the modified construction illustrated at Figs. 3 and 4.

Referring now to Figs. 1 and 2, A represents a scoop-like bucket or receptacle, which, by preference, is made, as shown, of a semi-cylindrical form. This bucket, which, in the case shown, is composed of plate metal or plate-iron, is formed or provided at its opposite ends and in a line about coincident with the axis of the bucket with projecting trunnions or pintle-like devices *a*, each of which is mounted and turns freely within a suitable bearing formed in the hub-like portion *b* of a metallic frame B, that is formed, as plainly shown, of a horizontal bar-like portion and a vertical portion, at the upper end of which vertical portion is a perforated hub or journal bearing *c*. These two metallic frames B are connected together at the opposite ends of their horizontal portions by laterally-arranged metallic bars C, while the upper ends of said frames carry within the journal-bearings *c* a shaft F, which runs parallel with the axis of the scoop-bucket, and is located sufficiently above the latter to permit of the presence on said shaft F and about at its middle, endwise, of a rope-wheel G, by means of which said shaft is rotated in first one and then the other direction through the medium of the working ropes or cables H, which, as clearly shown, have their lowermost ends secured to and partially wound upon the grooved peripheral portion of said wheel G, and which are supposed to extend upwardly to some suitable mechanism for winding up and letting out said cables in the proper manner at the requisite times.

Arranged with their lowermost ends adjacent and connected with the cross-bars C of the metallic frame-work there are two semi-cylindrical metallic housings, composed, in the case shown, of angle-irons *e*, partially within the depressions of which semi-cylindrical housings *e*, and near the ends thereof, are arranged four sprocket-wheels *l* or guide-sheaves, the journals of which are mounted to turn freely in metallic stands *f*, that are bolted to said semi-cylindrical housings, and partially around these sprocket-wheels *l* and two others *g*, which are mounted fast on the shaft F, all as plainly shown, pass two drive-chains or metallic belts *h*, a portion of each of which rides or runs within one of the semi-circular housings *e*.

D is a channel-iron or flanged plate, which

runs laterally at one side of the contrivance from one to the other of two of the horizontal arms of the metallic frame-work B, and which is designed to afford a superficial rest or bearing on the surface of the coal or material to be operated upon, and the flanges of which are designed, furthermore, to partially penetrate the material, all in a manner and for purposes to be presently explained.

E are braces which run, respectively, from the highest portions of the semi-cylindrical housings *e* to the upper portions of the vertical parts of the two metallic frames B, for the purpose of lending strength and stiffness to the combined devices composing the structure.

s are sprocket-like projections or lugs on the exterior of the bucket A, which engage at given points with the drive-chain *h*, in the manner clearly shown, and for the purpose of enabling said chain in its movements to cause said bucket to oscillate upon its trunnions *a*.

In the operation of a contrivance such as shown at these figures and so far described, the whole apparatus shown is supposed to be first lowered down onto the surface of the coal or other material to be handled in about the position or condition illustrated by the full lines in the drawings, after which, by winding up one of the cables H and paying out the other, (in the directions indicated by the arrows,) the shaft F is caused to rotate in its bearing *c*, whereby, through the medium of the sprocket-wheels *g*, fast on said shaft, the drive-chains *h* are caused to travel in a given direction, and thereby, through the medium of the lugs or sprockets *s* of the bucket or receptacle A, the latter is forced to oscillate on its axes *a* in the direction and to about the extent indicated by the dotted position of said bucket seen at Fig. 2, whereby the entering portion of the mouth edge or perimeter of said bucket is caused to scoop down into and then rise partially out of the mass of coal or other material, which during said motion of said bucket of course fills the latter, after which the whole contrivance may be bodily elevated by winding up on both the cables H, (or by means of some supplemental hoisting device,) and the filled bucket conveyed to any desired destination, at which it may be relieved of its contents by simply reversing the oscillatory movement of the bucket through the medium of the same devices by which it was made to fill itself, thus returning the bucket to its original position for reloading. During the filling operation the plate-like flanged device D affords a sufficient superficial bearing-surface on top of the coal or other material and at a point outside of that portion of the mass from which the bucket is designed to be filled to oppose the tendency of the frame B to tip on its line of axial connection with the bucket when the latter is being forced into the mass of material to fill it. At the same time the flange-



like downward projections of the device D operate to overcome any creeping tendency of the frame-work during the operation of forcing the working-edge of the scoop-like bucket or receptacle down into the material. It is evident, however, that the device may be constructed so that a sufficient superficial bearing-surface on top of the coal may be obtained from other parts thereof than the particular plate-like device D. For instance, in a conceivable form of construction, such bearing might be derived from internal bars, plates, or surfaces which would either wholly or in part dispense with the necessity of the outside bearing-surface shown.

It will be seen that in the use of a contrivance constructed and operating upon the principle shown and described not only are there no opposing or gripping receptacle or bucket edges between which the coal or other material has to be gripped and has to be crushed or sheared off to permit the closing together of such working-edges of the bucket, but, furthermore, the operation is such that the bucket is filled by simply being forced down into the material after the fashion of shoveling or scooping up said material and by merely displacing such particles of material as may lie in the path of motion of the working-edge of the scoop-like bucket, and that, therefore, comparatively little motive power is necessary to insure the filling of the receptacle or bucket A of my improved contrivance.

In the modified form of contrivance shown in Figs. 3 and 4 substantially the same operation as just described is involved; but instead of the two frames B, arranged one at each end of the bucket and having mounted on their uppermost portions the ends of a long shaft F, there is a rectangular frame-work composed of angle-irons  $B^2$   $i$ , on the former of which are suitable bearing-boxes  $d^2$ , in which are mounted the trunnions  $a$  of the bucket, and from the angle-irons  $i$ , which form the side portions of said frame-work, ascend the semicircular housings  $e$ , within which travel portions of the drive-chains  $g^2$ , each of which chains engages with a sprocket-wheel N, mounted fast on a short shaft K, and with two other sprocket-wheels or sheave-guides  $k$ , each of which is mounted in suitable bearings in a stand  $j$ , that is securely fastened to the angle-irons  $i$ , all as clearly shown, the said short shaft K being mounted to turn freely in the hub-like upper portions  $l$  of the metallic angular frames J, that extend upwardly from and that are securely fastened to the semicircular metallic housings  $e$ . On the middle of said short shaft K is secured a sprocket-wheel L, around which passes, peripherally, a drive-chain M, the two runs of which are supposed to extend upwardly to suitable mechanism, by means of which said chain can be driven in one or another direction to rotate the sprocket-wheel L one way

or the other, as may be required, to turn the shaft K and its sprocket-wheels N in the proper directions to traverse the chains  $g^2$  in such manner as to rotate, through the medium of the sprockets  $s$ , the bucket A, in the manner already explained.

Of course many modifications may be made in the details of construction beyond the changes which I have already shown and explained without departing from the main feature or gist of my invention, which rests in the idea of a single oscillatory bucket having combined with it a suitable supporting-frame and actuating devices, whereby the said bucket may be lowered with its perimeter or the edge of its mouth onto the surface of the material to be picked up, and may be then oscillated about an axis of motion in such manner as to scoop up the material in substantially the manner hereinbefore explained and without either subjecting the material to any severe crushing or shearing action and without requiring the expenditure of the great power necessary to operate any device which involves the principle of two converging or opposing bucket-edges which have to grip the material to be gathered up and carried off.

Having now so fully explained my novel construction of contrivance that those skilled in the art can make and use it, either in the form shown or under some modification thereof, what I claim as new, and desire to secure by Letters Patent, is—

1. In a contrivance for gathering up and removing coal or other material, a single bucket-like device or receptacle having an axis of motion located within itself and the working or entering edges of which move downwardly into the mass of material to be gathered up, and thence move upwardly through said mass, in combination with suitable means for imparting such action to said bucket-like device, all in substantially the manner and for the purpose hereinbefore set forth.

2. In a contrivance for gathering up and removing coal or other material, the combination of the following instrumentalities, viz: first, a single oscillatory bucket or receptacle adapted to pass downwardly into and thence upwardly through the material in substantially the manner specified; second, a suitable frame-work adapted to rest on top of the material to be handled and having the said bucket pivotally connected therewith, substantially as described, and, third, means which effect a partial rotation of said bucket round about its pivotal connections with the said frame, the said combination being and operating in the manner and for the purposes hereinbefore set forth.

3. In combination with a suitable frame-work adapted to rest on the material to be handled, an oscillatory bucket or receptacle pivotally connected with said frame-work and a drive-shaft mounted in the upper por-

tion of said frame-work, one or more drive-  
wheels mounted on said shaft, one or more  
chains arranged in engagement with said  
wheels, a series of chain-wheels mounted on  
5 the lower portion of said frame-work, and  
chain channels or housings *e*, within which  
travel such portions of the chain as effect an  
engagement with the bucket to be rotated, all

substantially in the manner and for the pur-  
poses hereinbefore set forth. 10

In witness whereof I have hereunto set my  
hand this 8th day of March, 1889.

ALEX. E. BROWN.

In presence of—

GEORGE C. WING,  
H. F. BALCOM.