

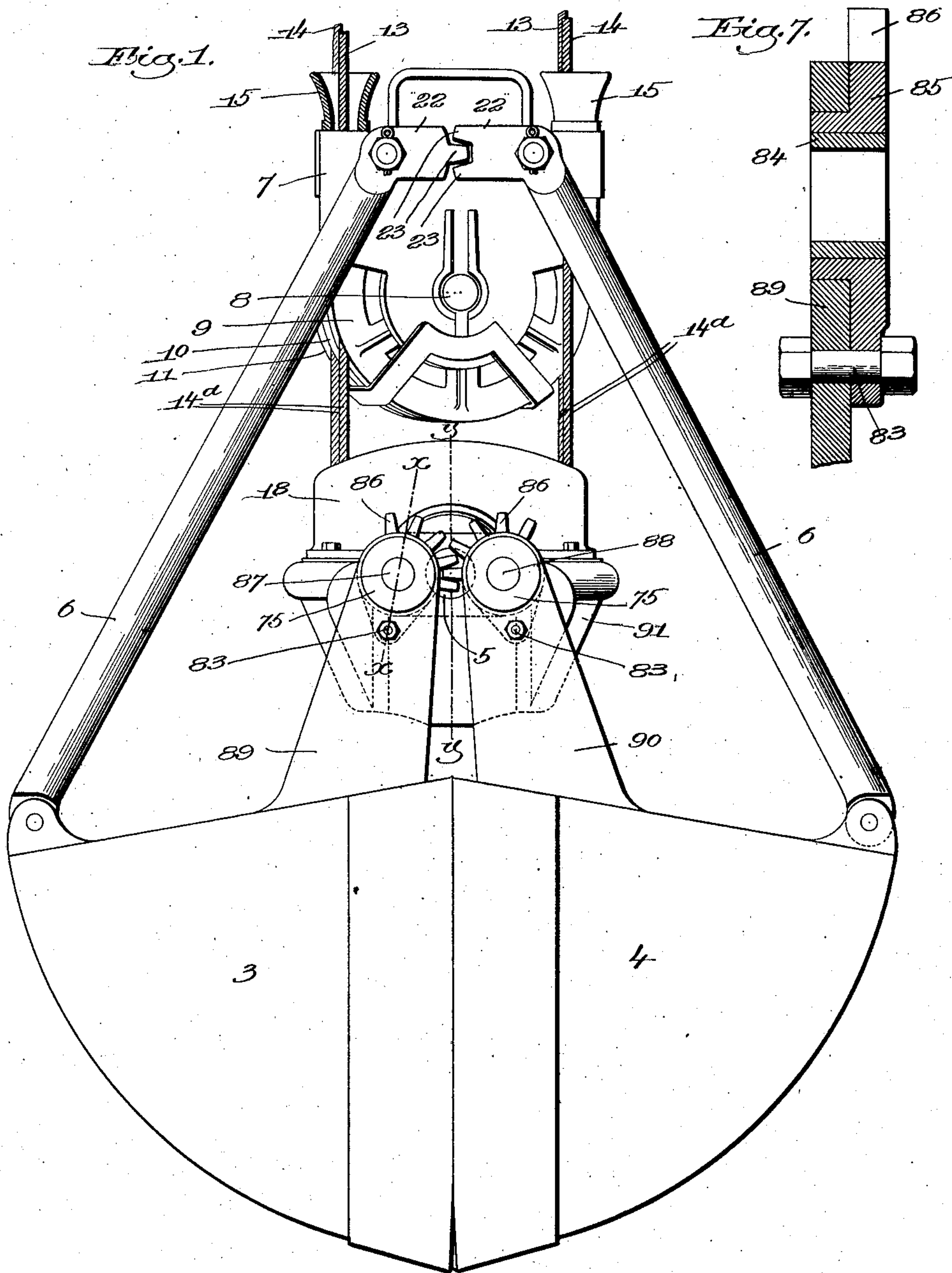
A. E. NORRIS.
HOISTING BUCKET.

APPLICATION FILED DEC. 5, 1906. RENEWED SEPT. 29, 1910.

992,799.

Patented May 23, 1911.

5 SHEETS—SHEET 1.



witnesses:
Fred S. Grunhof
W. C. Lunsford

Inventor.
A. E. Norris,
by Stanley Freymy,
att'y

A. E. NORRIS.

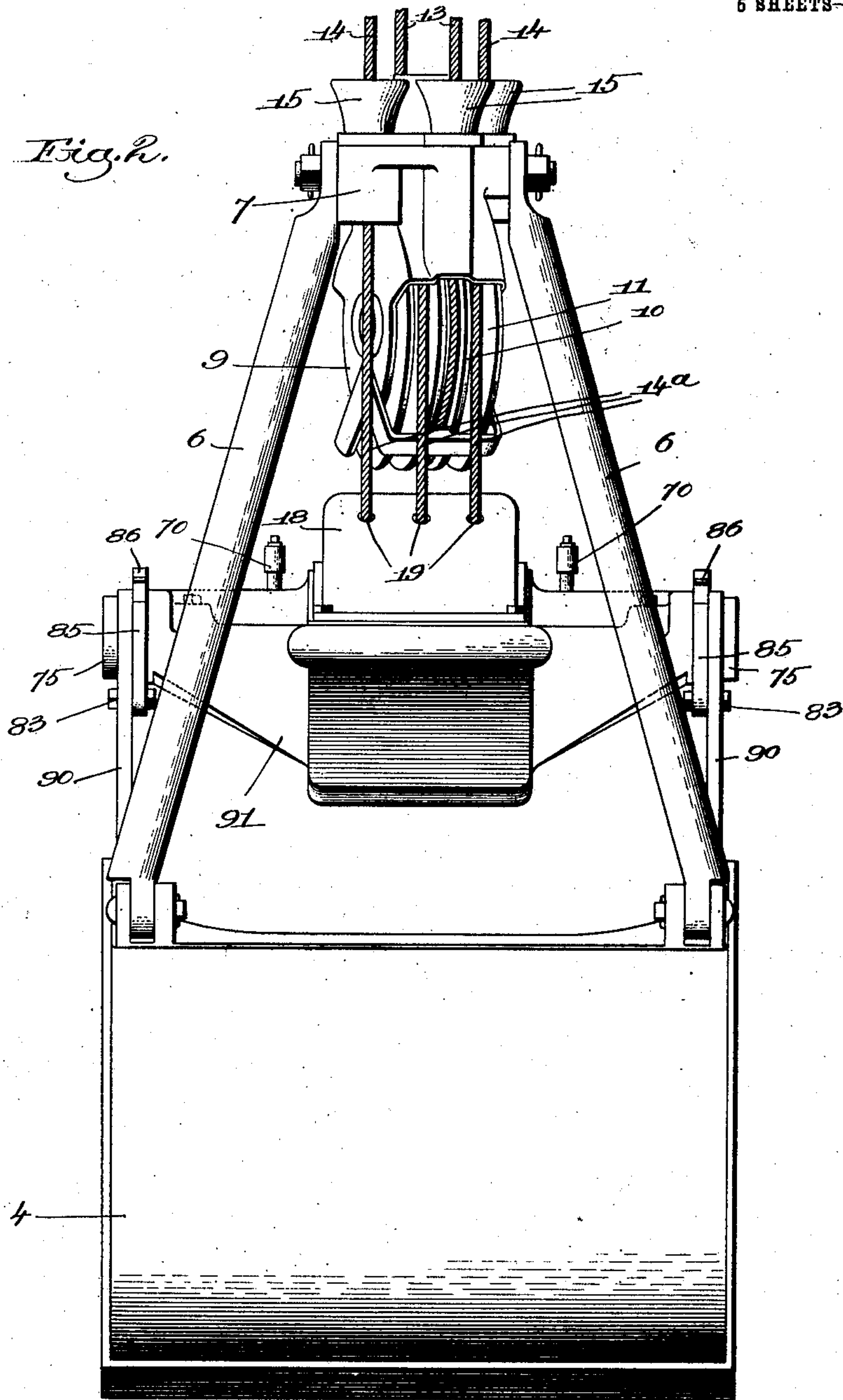
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6 SHEETS-SHEET 2.



Witnesses:
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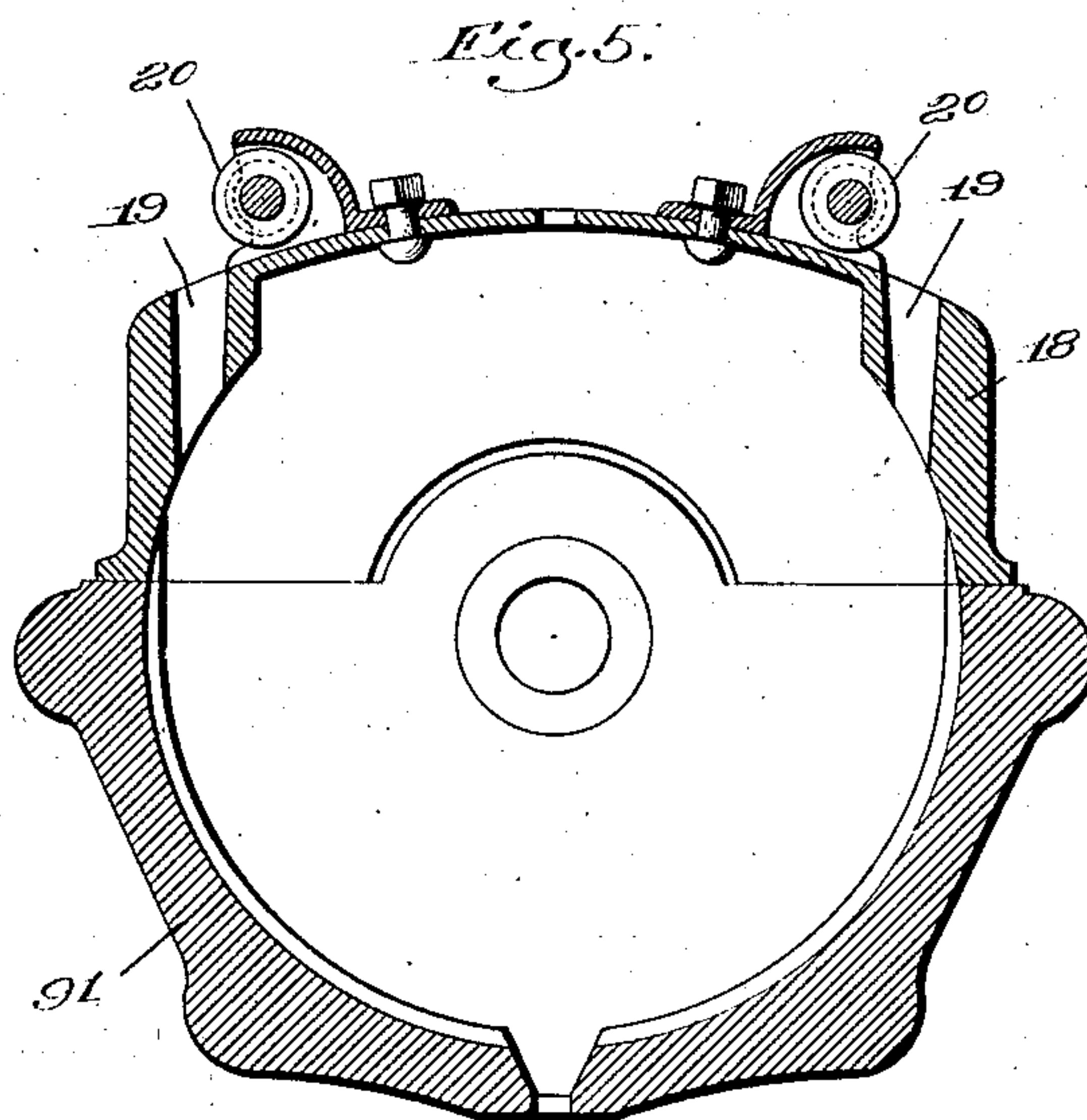
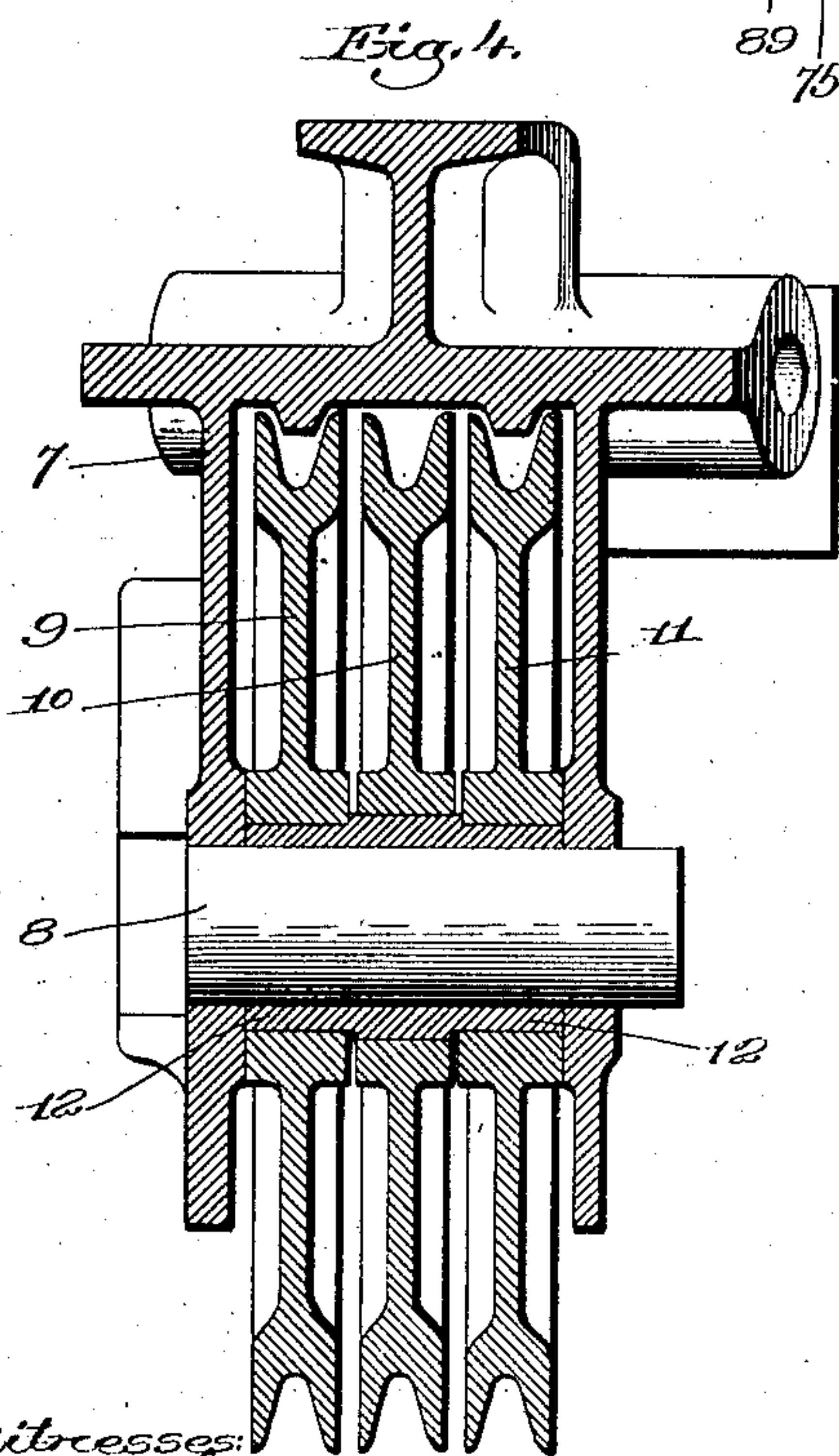
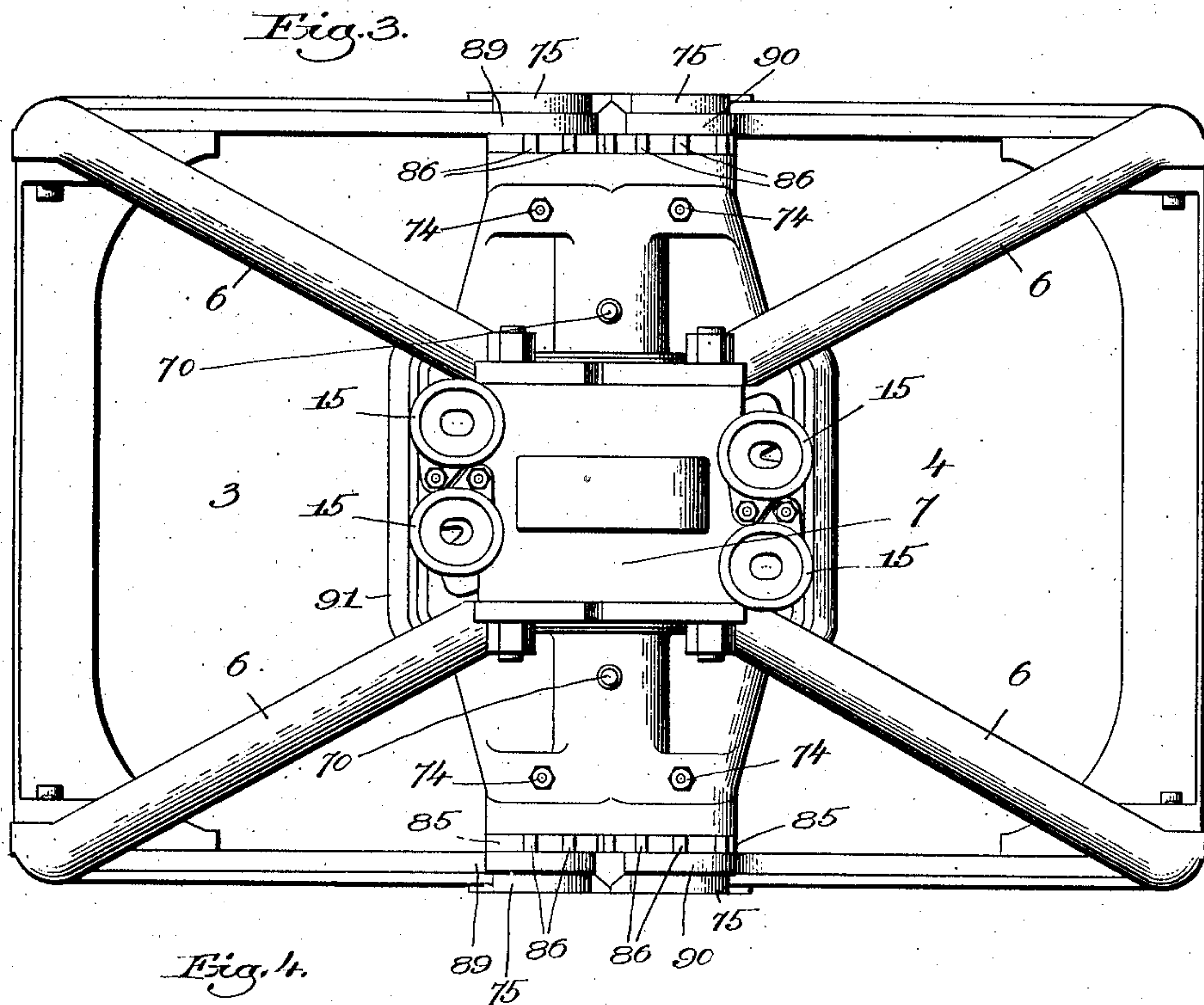
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5 SHEETS—SHEET 3.



Witnesses:
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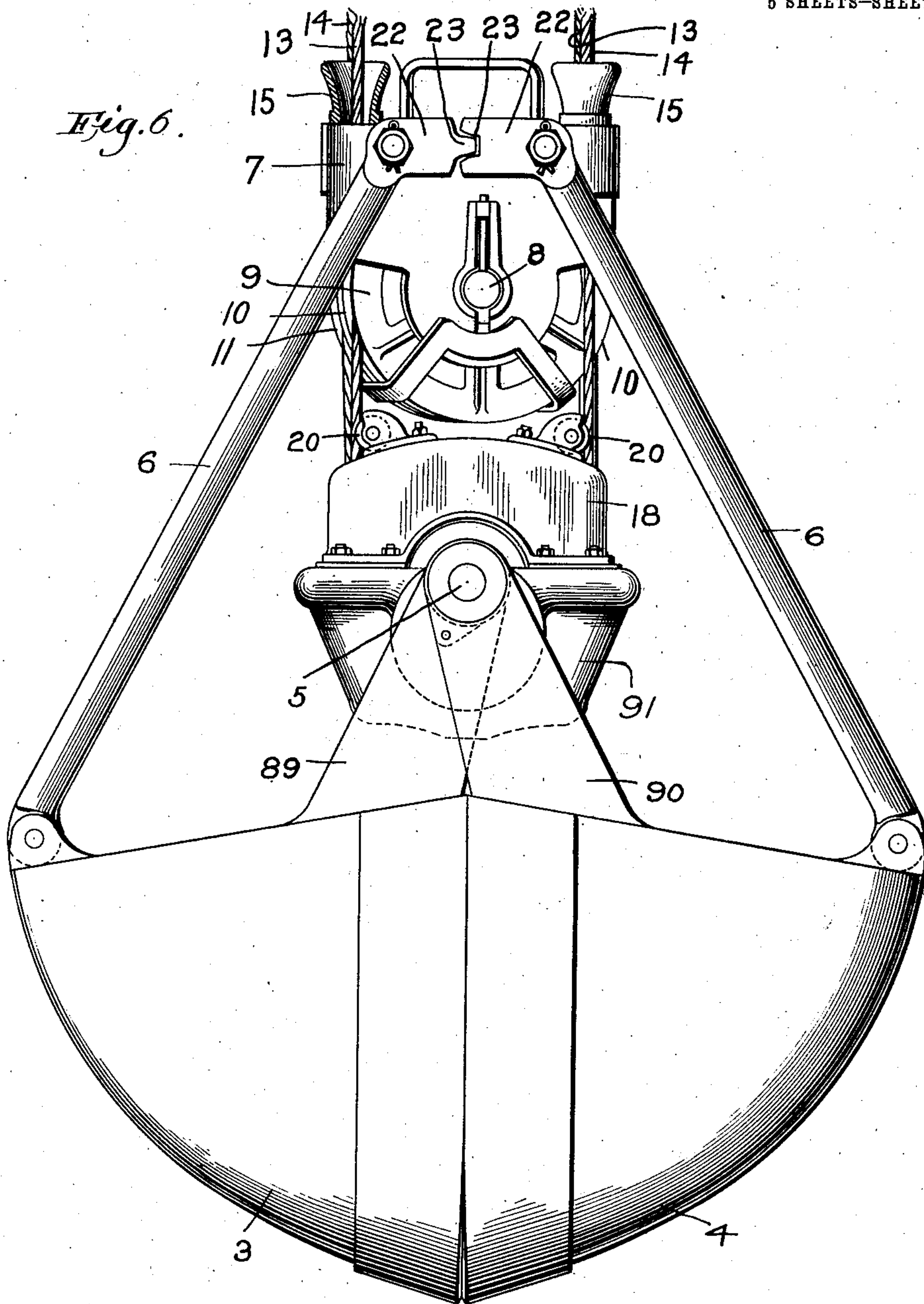
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5 SHEETS—SHEET 4.



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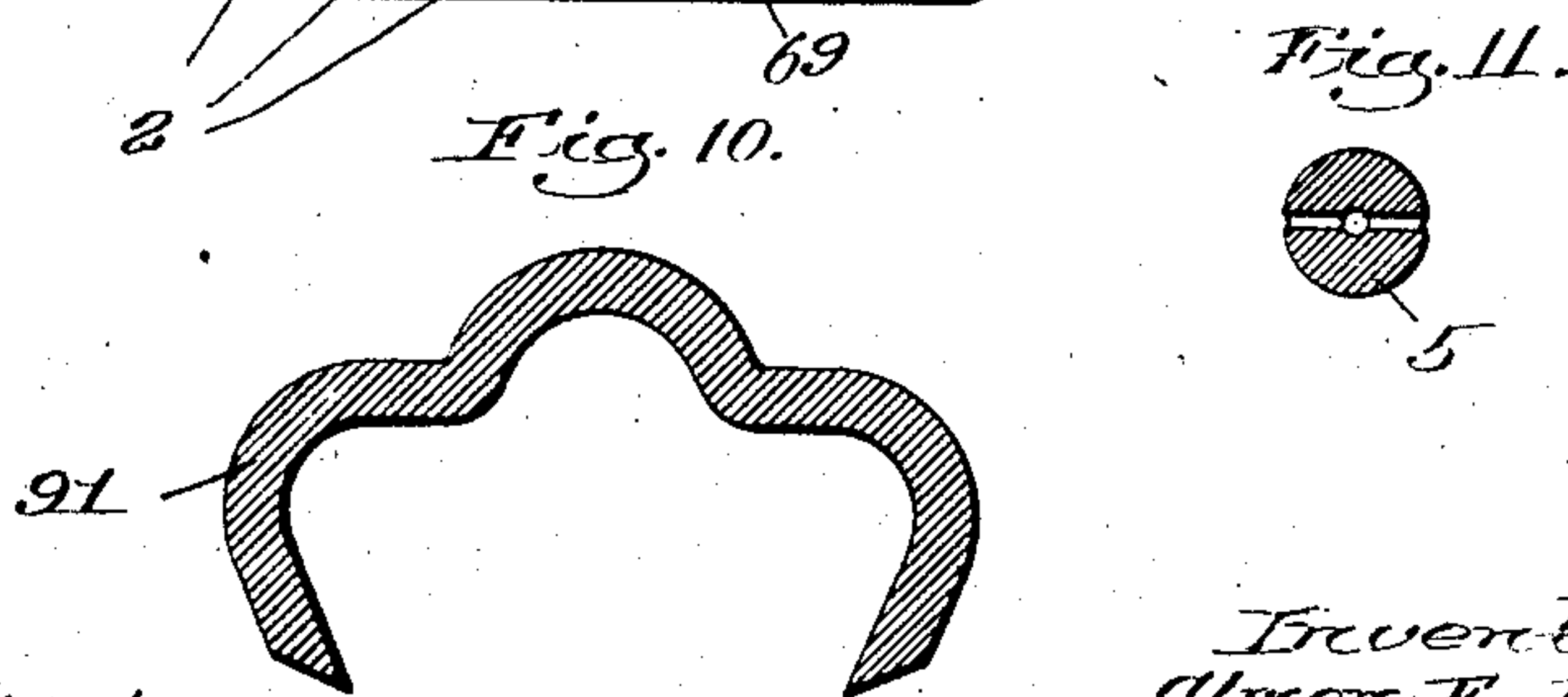
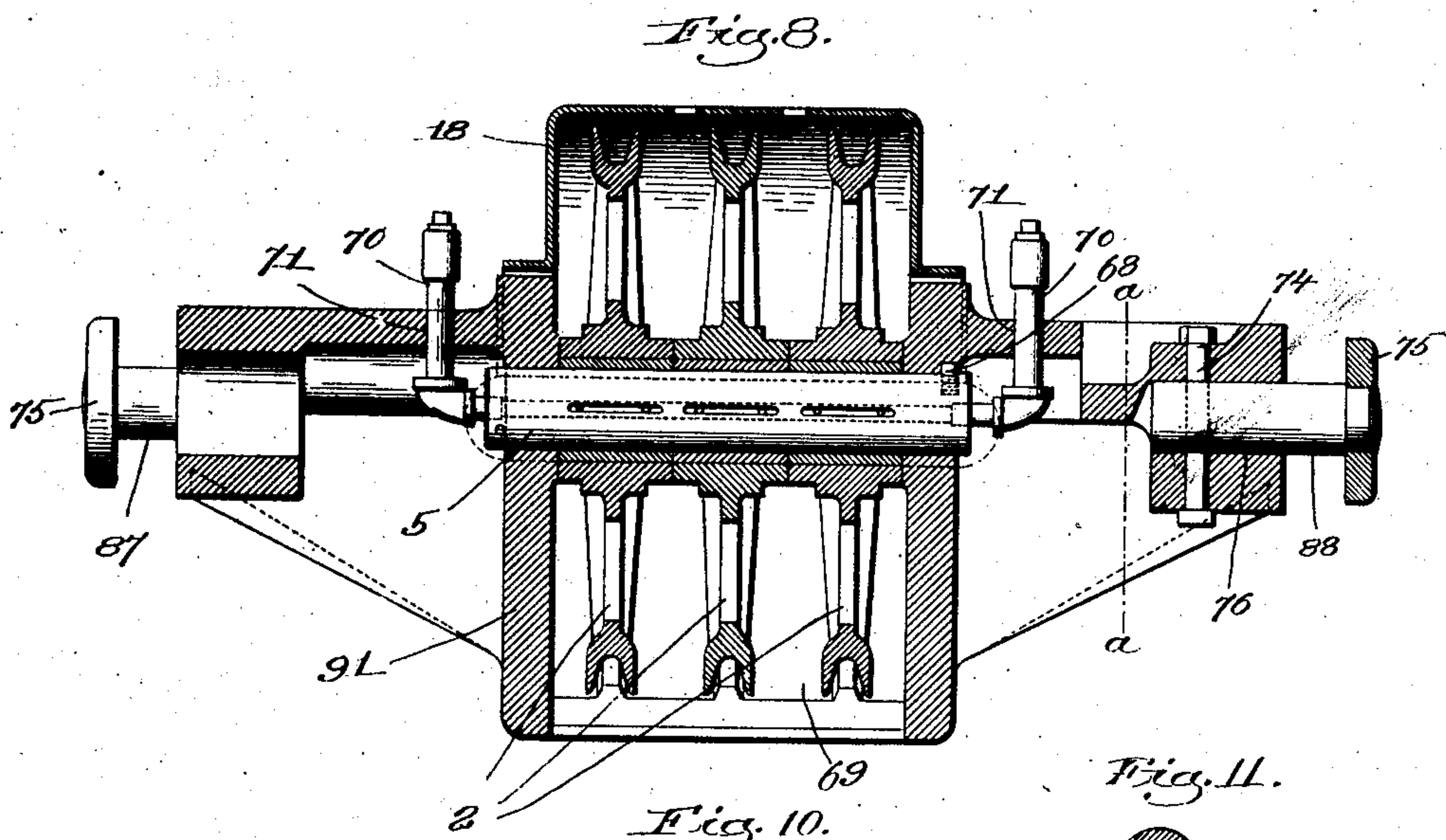
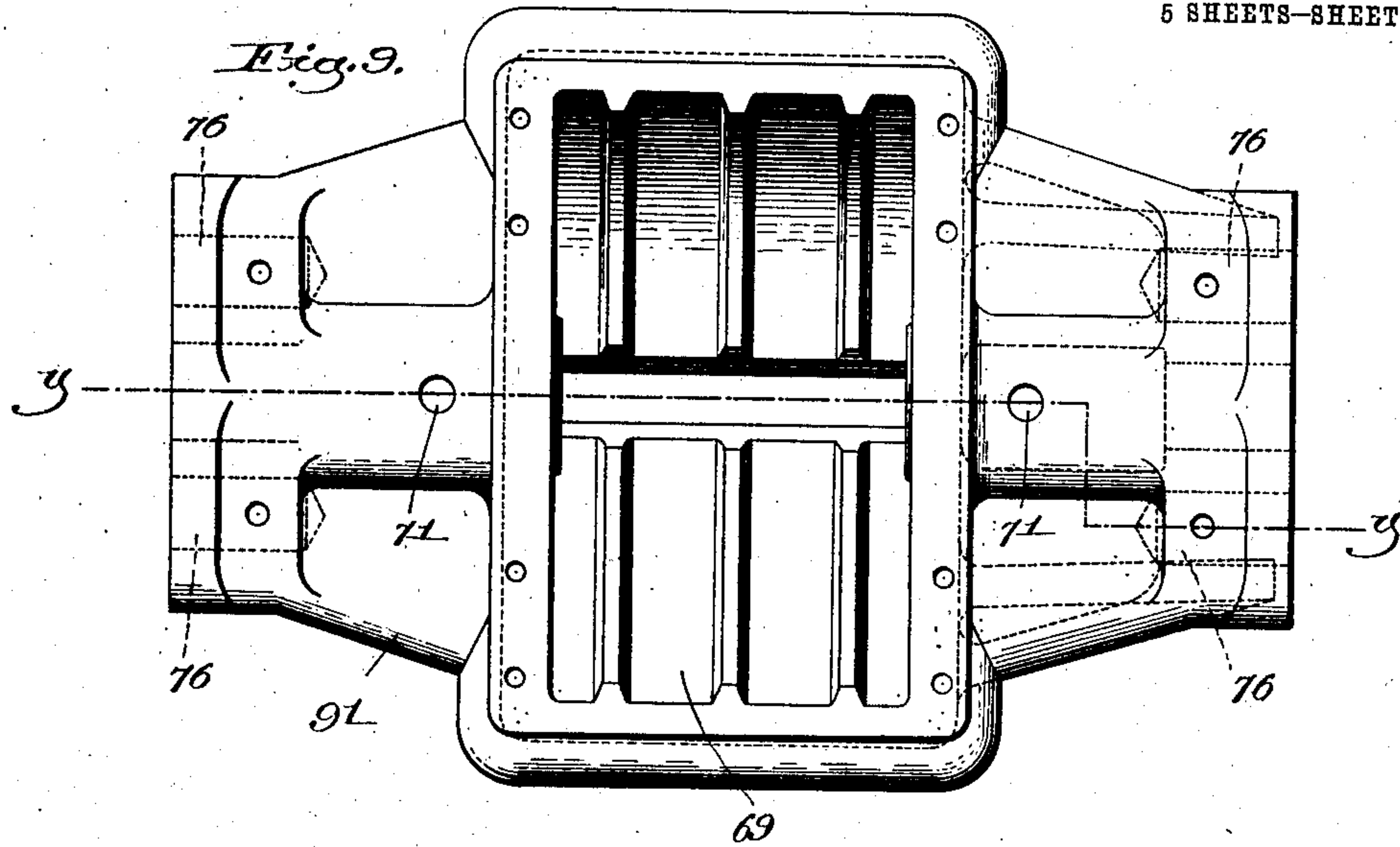
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5 SHEETS—SHEET 5.



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UNITED STATES PATENT OFFICE.

ALMON E. NORRIS, OF CAMBRIDGE, MASSACHUSETTS.

HOISTING-BUCKET.

992,799.

Specification of Letters Patent.

Patented May 23, 1911.

Application filed December 5, 1906, Serial No. 346,380. Renewed September 29, 1910. Serial No. 584,575.

To all whom it may concern:

Be it known that I, ALMON E. NORRIS, a citizen of the United States, residing at Cambridge, county of Middlesex, and State of Massachusetts, have invented an Improvement in Hoisting-Buckets, of which the following description, in connection with the accompanying drawing, is a specification, like letters on the drawing representing like parts.

This invention relates to hoisting buckets, and has for its object to improve this class of devices in the particulars hereinafter described and then more fully pointed out in the claims.

In the drawings, Figure 1 is a side view of a bucket embodying my invention; Fig. 2 is an end view thereof; Fig. 3 is a top plan view with the holding rope and opening-and-closing rope omitted; Fig. 4 is a vertical section through the head and the sheaves therein; Fig. 5 is a vertical section through the weight showing one embodiment of my invention; Fig. 6 is a side view of a bucket showing another embodiment of my invention; Fig. 7 is a section on the line x, x , Fig. 1; Fig. 8 is a vertical section through the weight on the line y, y , Fig. 1; Fig. 9 is a plan view of the weight 91 with the cover and sheaves removed; Fig. 10 is a section on the line $a-a$, Fig. 8; Fig. 11 is a transverse section through the shaft 5.

The bucket herein shown comprises the usual bucket segments 3 and 4 which are pivotally connected to the weight 91, and which have pivotally connected to the corners thereof the lower ends of the links 6, the upper ends of which links are pivoted to the head. The head of the bucket is designated generally by 7, and it has mounted therein a pivotal pin 8 on which are journaled the three sheaves 9, 10 and 11. The holding rope 13, instead of having one end fastened directly to the head as is sometimes done, is carried around the central sheave 10 so that the said sheave is supported in a bight of the said holding rope. In practice one end of the holding rope will be fastened to the end of a boom or to the end of a track on which runs the trolley from which the bucket is supported, and after passing around the central sheave 10, said holding rope will be led to and wound about a drum of the engine.

The opening-and-closing rope, which is

designated by 14, is passed around the two sheaves 9 and 11 and also is wound about other sheaves 2 journaled on the shaft 5, which is supported by the weight 91. Preferably the sheaves 9, 10 and 11 in the head will have such an angular relation to the sheaves 2 carried by the shaft 5 that the rope will run freely around said sheaves.

In using buckets of this type, when it is desired to open the bucket, said bucket is suspended by the holding rope 13 and the opening-and-closing rope is slackened, thus allowing the weight 91 to descend and cause the bucket segments to open. To close the bucket, the opening-and-closing rope is tightened, thus lifting the weight and closing the bucket segments. During the opening and closing movements of the bucket, the central sheave 10 around which the holding rope passes is stationary, while the outside sheaves 9 and 11 rotate as the opening-and-closing rope is drawn in or paid out. When the bucket is being carried from one end of the track or boom to the other, or is being raised or lowered, all the sheaves 9, 10 and 11 will be rotating in unison. In order to minimize the wear which occurs between the sheaves in the head and the bearings therefor, I will preferably construct the central sheave 10 with the elongated hub 12 on which the two outside sheaves 9 and 11 are loosely mounted, as best seen in Fig. 4, the hub 12 of the central sheave being loosely journaled on the pivotal pin 8. With this construction, it will be seen that when the bucket segments are being opened or closed, the hub 12 will be stationary on the pivotal pin 8, and the only place where wear will occur will be on the bearing surfaces between the sheaves 9 and 11 and the hub 12 and that when the bucket is traveling along the track, or is being raised or lowered, the only bearing surfaces moving relative to each other are the bearing surfaces between the hub 12 and the pin 8. The long hub 12 practically gives to the outside sheaves 9 and 11 a long bearing on the pivotal pin 8, and with this construction the wear at the bearings of the sheaves in the head is reduced to a minimum.

In practice I propose to operate the bucket in such a way that substantially one-third of the weight of the bucket, when it is being transported along the trolley, will be sustained by the opening-and-closing rope, and

two-thirds of the weight will be sustained by the holding rope. When this is the condition, two-thirds of the weight of the bucket is taken by the sheave 10 and one-third by the two sheaves 9 and 11. The strain on the opening-and-closing rope, however, is equal throughout its entire extent so that substantially one-sixth of the weight of the bucket, whether loaded or unloaded, is sustained by each run of said rope between the sheaves in the head and those in the weight. The two portions of the rope which pass over each of the sheaves 9 and 11, therefore, sustains one-third of the weight, and as a consequence there will be a downward pull on each sheave in the head equal to one-third of the weight (the downward pull on both sheaves thus equaling approximately two-thirds of the weight) and an upward pull on the central sheave 10 equal to approximately two-thirds of the weight. The downward pull on the outside sheaves, therefore, will counterbalance the upward pull on the central sheave and as a result approximately no strain will come on the pivotal pin 8. All binding or cramping of the sheaves is thus avoided, and the wear reduced to a minimum.

Both the opening-and-closing rope and the holding rope extend through apertures in the head 7 as usual.

The bucket herein shown is one in which ropes instead of chains are used for opening and closing or for hoisting the bucket. If the ropes thus used are made of wire it is desirable that they should be prevented from being bent too sharply during the operation of the bucket; in fact it is desirable that these ropes should not under any circumstances be bent into a curve of a less radius than they are bent in passing over the sheaves. To prevent any sharp bending of either of the ropes after passing through the head, I have provided the head with leaders or guides 15 which are made with flaring mouths, as best seen in Fig. 1, and the inside curvature of each leader is substantially the same as the curvature of the rope-receiving portions of the sheaves. With this construction, the leaders prevent the rope from making any sharp bend as it passes out from the aperture in the head and thus prevents injury to the rope from this cause.

In clam-shell buckets of this type as now commonly constructed, the bucket structure is apt to collapse and the head thereof to become twisted and thrown out of position, when the bucket is dropped into the material which is to be excavated preparatory to closing the bucket. This is especially true where the head is supported in the bight of the holding rope so that the point of suspension is below the point where the links are pivoted to the head. In order to avoid

this disadvantage and to provide a bucket in which the parts and especially the head will always maintain their proper position under all circumstances, I have, in this embodiment of my invention so connected the upper ends of the links on each side of the head that they will serve to maintain the head in its correct vertical position. In the embodiment of the invention herein shown this end is accomplished by providing the two links on each side of the head with arms or extensions 22 which have an intermeshing engagement with each other. These arms or extensions are rigid with the links and preferably integral therewith, each link being bent inwardly at its upper end, as best seen in Figs. 1 and 6. These arms are provided with teeth 23 having an intermeshing engagement the result of which construction is that the head 7 is always maintained in its correct vertical position.

It frequently happens that during the use of buckets of this type the sheaves 2 carried by the weight become choked with the material being handled. To avoid this I have in my present invention entirely incased these sheaves by providing a cover or closure 18 which is preferably detachably secured to the weight 91. This cover 18 is provided with apertures 19 through which the various runs of the opening-and-closing rope 14 pass, and it obviously prevents any of the material being handled from interfering in any way with the operation of the sheaves 2.

In those types of buckets in which the weight is sustained at each end upon the pivotal pin to which the arms of the bucket are fastened, such for instance as illustrated in Patent No. 699,343, May 6, 1902, the weight often becomes twisted or turns on its pivotal pin to such an extent as to cause the opening-and-closing rope to chafe on the weight. This is especially true where the sheaves are covered in as shown in the accompanying drawings. In my improved bucket, herein illustrated, I have provided for maintaining the weight 91 always in its true vertical position, thus preventing it from turning sufficiently to chafe or wear the opening-and-closing rope. I have illustrated two ways in which this may be accomplished. In Fig. 1 the two arms 89 and 90 of the bucket segments are pivoted to the weight to turn about different axes and are geared together so that it will be impossible for the weight to swing or turn about a horizontal axis. In this embodiment of my invention, the weight 91 has extended from each end thereof two studs or trunnions 87, 88 to which the arms 89 and 90 are pivoted, and each of said arms is provided with gear teeth 86, the gear teeth of adjacent arms meshing, as best seen in Fig. 1. I prefer to form these gear teeth 86 on bearing mem-

bers 85 which overlie the arms, as shown in Fig. 7, and each of which is provided with the hub portion 84 which extends through an aperture in the corresponding arm. By this construction the members 88 not only serve as the gear for connecting the arms but it provides a much longer bearing to the trunnions 87, 88, than would be afforded merely by the thickness of the arm 89. This is made clear by reference to Fig. 7. The member 85 may be secured to the arm in any suitable way, as by a bolt 83. In this construction since the weight 91 is supported at two points at each end, and since the two arms 89, 90, are geared together it will be impossible for the weight to be thrown out of its true perpendicular position. The trunnions 87, 88 are preferably detachably secured to the weight so that by simply removing them either or both bucket segments can be readily removed. As herein shown each trunnion is provided with a head 75 and is loosely received in a recess 76 in the end of the weight, each trunnion being held in place by means of a bolt 74 which extends transversely through the shank of the trunnion. By simply removing the bolt 74 the corresponding trunnion may be removed and in this way the removing of any bucket segment is a simple matter.

In Figs. 5 and 6 I have shown an embodiment of my invention in which the weight 91 is prevented from twisting by means of guide sheaves 20 which are carried by the cover 18 and which are situated adjacent each of the apertures 19. These guide pulleys by bearing against the runs of the rope 14 serve to maintain the proper position of the weight 91.

The shaft 5 on which the sheaves 2 are supported preferably has connected thereto at each end an oil duct or oil cup 70 which extends upwardly through an aperture 71 in the top of the weight, as seen in Fig. 8, and said shaft may be provided with a longitudinal bore provided with oil ducts which lead to the sheaves. The sheaves may thus be readily oiled by simply introducing oil into either or both of the oil ducts or cups 70. The weight is provided with the chamber 69 in which the sheaves 2 are received, and the ends of the weight have the cross sectional shape shown in Fig. 10. If it is desired to remove any one of the sheaves 2 the oil cups 70 may be disconnected from the shaft 5 and the latter may then be slipped endwise sufficiently to withdraw it from the sheave desired to be removed, when said sheave may be readily removed by taking off the cover 18. The shaft 5 is preferably held from rotary movement by means of a "dutchman" 68, which may be removably sustained by the shaft.

A bucket having the above construction is one which will hold its shape under all

circumstances, even when it is dropped into the material being excavated. Moreover, I have found that by pivoting the bucket segments to the weight, as shown in Fig. 1, the bucket has a wider reach and the weight 91 stands at a higher level when the bucket is open than with the construction such as shown in Fig. 6 where the two arms of the bucket are pivoted to turn about the same axis. My invention, however, is not limited to the precise details herein shown.

Having described my invention what I claim as new and desire to secure by Letters Patent is:—

1. In a bucket, the combination with two bucket segments, of a head to which said bucket segments are secured, three axially alined sheaves carried by the head, a holding rope passing around one sheave, and an opening-and-closing rope passing around the other sheaves.

2. In a bucket, the combination of two bucket segments, of a head to which the bucket segments are secured, said head carrying a pivotal pin, three sheaves sustained by said pin, a holding rope passing around one sheave, and an opening-and-closing rope passing around the other sheave.

3. In a bucket, the combination of two bucket segments, of a head to which said bucket segments are secured, three axially alined sheaves sustained by said head, two of the sheaves having bearing on the other sheave, a holding rope passing around one sheave, and an opening-and-closing rope passing around the other sheave.

4. In a bucket, the combination of two bucket segments, of a head to which said bucket segments are secured, three axially alined sheaves sustained by said head, a holding rope passing around one sheave, and an opening-and-closing rope passing around the other sheaves, said latter sheaves having bearing on the former sheave.

5. In a bucket, the combination with two bucket segments, of a head to which the segments are connected, a pivotal pin carried by said head, a sheave for the holding rope mounted on said pin, and two sheaves for the opening-and-closing rope mounted to turn on the hub of the first-named sheave.

6. In a bucket, the combination with two bucket segments, of a head to which said segments are secured, a pivotal pin carried by said head, a sheave loosely mounted on said pin and having extended hubs, a holding rope passing around said sheave, two other sheaves supported on the extended hubs of the first sheave, and an opening-and-closing rope wound about said latter sheaves.

7. In a bucket, the combination with two bucket segments, of a sheave having extended hubs, a holding rope extended about said sheave, two other sheaves mounted on

the hubs of the first-named sheave, and an opening-and-closing rope passing over said last-mentioned sheaves.

8. In a bucket, the combination with two bucket segments, of a member to which said segments are pivotally connected, a head, sheaves carried by the head, other sheaves carried by said member, an opening-and-closing rope passing around said sheaves, and means to inclose the sheaves carried by said member.

9. In a bucket, the combination with two bucket segments, of a weighted member to which said segments are pivoted, said weighted member having a sheave-receiving pocket, sheaves mounted in said pocket, and a cover or closure for the sheaves.

10. In a bucket, the combination with two bucket segments, of a weight to which said segments are pivoted, said weight having a sheave-receiving pocket, sheaves mounted in said pocket, a cover or closure for the sheaves, said cover or closure having rope-receiving apertures, and an opening-and-closing rope passing around said sheaves and through the apertures.

11. In a bucket, the combination with two bucket segments, of a head, sheaves carried thereby, an opening-and-closing rope extending around said sheaves and through an aperture in the head, and a leader or guide for the rope carried by the head, said leader or guide having a flaring mouth, the curvature of which is substantially the same as that of the rope receiving portion of the sheave.

12. In a bucket, the combination with two bucket segments, of a head, links pivotally connecting the head and the bucket segments, and means to maintain the head in its vertical position at all times.

13. In a bucket, the combination with two bucket segments, of a head, links pivotally connecting the head with the bucket segments, a holding rope connected to the head, the point at which the head is suspended from the holding rope being below the point of connection between the links and the head, and means to maintain the head in its vertical position.

14. In a bucket, the combination with two bucket segments, of a head, and links connecting the head with the segments, the links connected to one bucket segment having an intermeshing engagement with those connected to the other bucket segment.

15. In a bucket, the combination with two bucket segments, of a head, and links connecting the head with the upper rear corner of each segment, the links which are connected to one bucket segment having an intermeshing engagement with those connected to the other bucket segment.

16. In a bucket, the combination with two bucket segments, of a link pivoted to each

bucket segment, and a head to which said links are also pivoted, the ends of the links which are pivoted to the head having an intermeshing engagement.

17. In a bucket of the clam-shell type, the combination with a sheave-receiving member, of two clam-shell bucket segments pivoted directly thereto, to turn about different axes, and means to open and close said bucket segments.

18. In a bucket of the clam-shell type, the combination with a head, of a sheave-receiving member, two clam-shell bucket segments pivoted directly to the sheave-receiving member to turn about different axes, sheaves mounted in said sheave-receiving member, and an opening-and-closing rope passing around said sheaves.

19. In a bucket, the combination with two bucket segments, of a sheave-receiving member to which said segments are pivotally connected, sheaves for the opening-and-closing rope carried by said member, and means to prevent said member from turning as the bucket is opened or closed.

20. In a bucket, the combination with two bucket segments, of a weighted member to which said segments are pivoted to turn about different axes, and means to open and close the bucket.

21. In a bucket, the combination with two bucket segments, of a member to which the bucket segments are pivoted, gearing connecting the bucket segments, and means independent from said gearing to open and close the bucket.

22. In a bucket, the combination with two bucket segments, each having rigid there-with an arm extending upwardly therefrom, of a member to which the arms of the bucket segments are pivoted, and gearing connecting the arms.

23. In a bucket, the combination with two bucket segments, each having rigid there-with an upwardly-extending arm, of a weight member to which the arms are pivoted, each arm having at its upper end gear teeth intermeshing with the gear teeth of the adjacent arm.

24. In a bucket, the combination with two bucket segments, each having upwardly-extending arms, a weight member having at its end two trunnions on which the arms are pivoted, and a bushing member lining the aperture of each arm provided with gear teeth to intermesh with corresponding gear teeth associated with the adjacent arm.

25. In a bucket, the combination with a head, of two bucket segments having upwardly-extending arms, a weight member to which said arms are pivoted, links connecting the bucket segments with the head, said links having intermeshing engagement at their upper ends, and gearing connecting the arms of the two bucket segments.

26. In a bucket, the combination with a sheave-receiving member and two removable trunnions carried thereby at each end thereof, of two bucket segments pivoted to said trunnions, and sheaves for the opening-and-closing rope carried by said member.

27. In a bucket, the combination with two bucket segments, of a member having at each end two removable trunnions on which the bucket segments are pivoted.

28. In a bucket, the combination with two bucket segments, of a sheave-receiving member to which the bucket segments are pivoted, sheaves for the opening-and-closing rope sustained in said member, said sheaves being capable of removal without disconnecting the bucket segments from said member.

29. In a bucket, the combination with two bucket segments, of a sheave-receiving member, trunnions carried thereby on which the bucket segments are pivoted, a pivotal pin separate from the trunnions and also carried thereby, and sheaves for the opening-and-closing rope mounted on said pin.

30. In a bucket, the combination with two bucket segments, of a sheave-receiving member, trunnions carried thereby on which the bucket segments are pivoted, a pivoted pin separate from the trunnions and also carried thereby, and sheaves for the opening-and-closing rope mounted on said pin, said pin being capable of withdrawal to permit the sheaves to be removed without disturbing the trunnions.

31. In a bucket, the combination with two bucket segments of a sheave-receiving member to which said segments are separately pivoted, sheaves in said member, a head to which the bucket segments are pivotally connected, and sheaves in the head having an angular relation to those in the sheave-receiving member.

32. In a bucket, the combination with two bucket segments of a weight to which the segments are pivoted to turn about different axes, a head to which the buckets are also pivotally connected, sheaves in the weight, other sheaves in the head having an angular relation to those in the weight, and an opening-and-closing rope passing around said sheaves.

33. In a bucket, the combination with two bucket segments each having an arm extending upwardly therefrom of a weight to which the arms of the bucket are pivoted, gearing connecting said arm, a head pivotally connected to the bucket segments, sheaves in the head, and other sheaves in the weight, the former sheaves having an angular relation to the latter.

34. In a bucket, the combination with two bucket segments, of a head, links connecting said head with said segments, and means for maintaining the head in vertical position.

35. In a bucket, the combination with two bucket segments, of a head, links connecting said head with said segments, and means associated with the links for maintaining the head in vertical position as the bucket is opened and closed.

36. In a bucket, the combination with a head, of a sheave-receiving member, two bucket segments pivoted thereto to turn about different axes, sheaves sustained by said head, other sheaves sustained by said sheave-receiving member, and an opening and closing rope passing about said sheaves.

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

ALMON E. NORRIS.

Witnesses:

LOUIS C. SMITH,
MARGARET A. DUNN.