

No. 652,198.

Patented June 19, 1900.

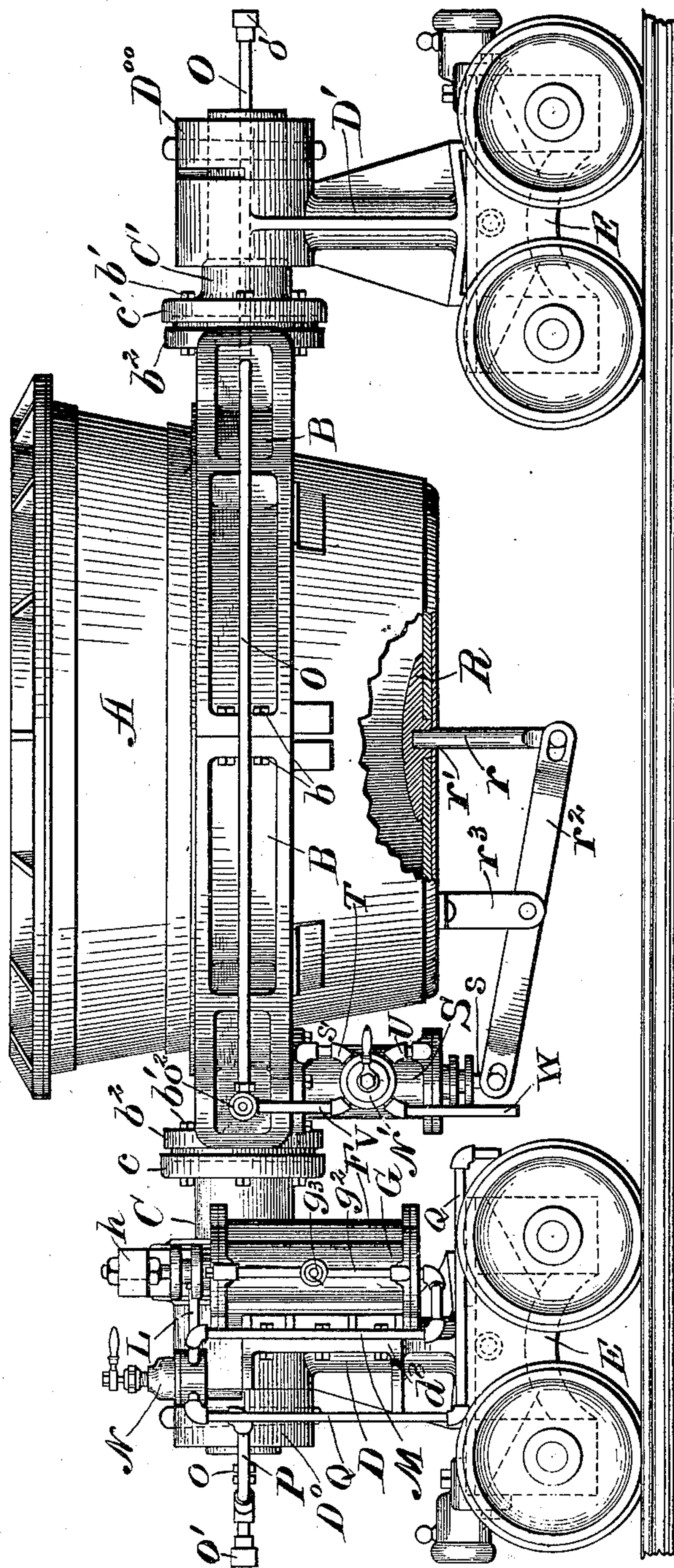
S. STEWART.
DUMPING CAR.

(Application filed Oct. 18, 1899.)

(No Model.)

7 Sheets—Sheet 1.

Fig. 1.



Witnesses

Percy C. Bowen,
John H. Valt.

Samuel Stewart,
by Milkins & Fisher,
Attorneys.

No. 652,198.

Patented June 19, 1900.

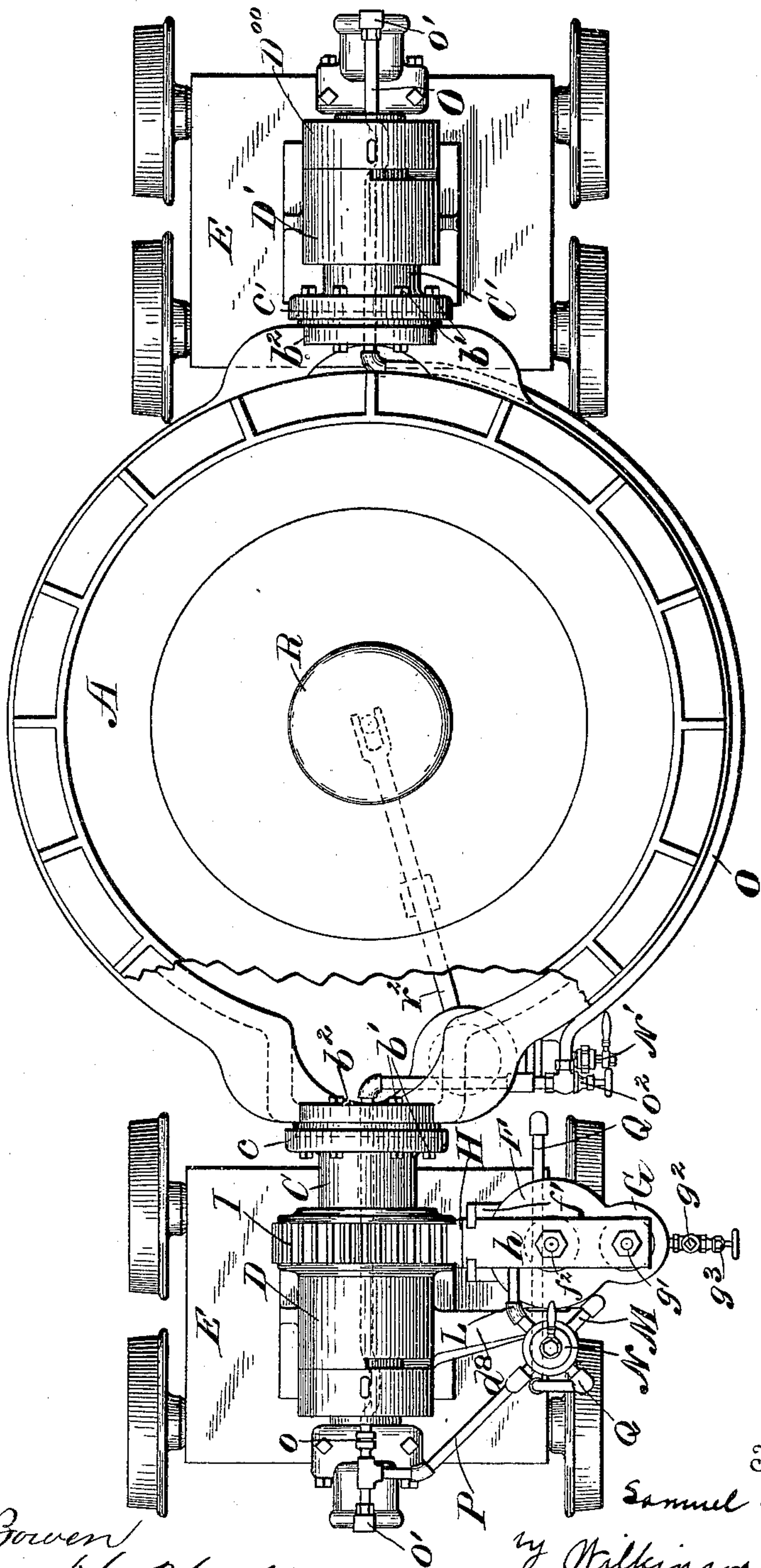
S. STEWART.
DUMPING CAR.

(Application filed Oct. 18, 1899.)

(No Model.)

7 Sheets—Sheet 2.

FIG. 2-



Witnesses
Percy C. Bowen
John H. Valt.

Inventor
Samuel Stewart,
by *Wilkinson & Fisher,*
Attorneys.

No. 652,198.

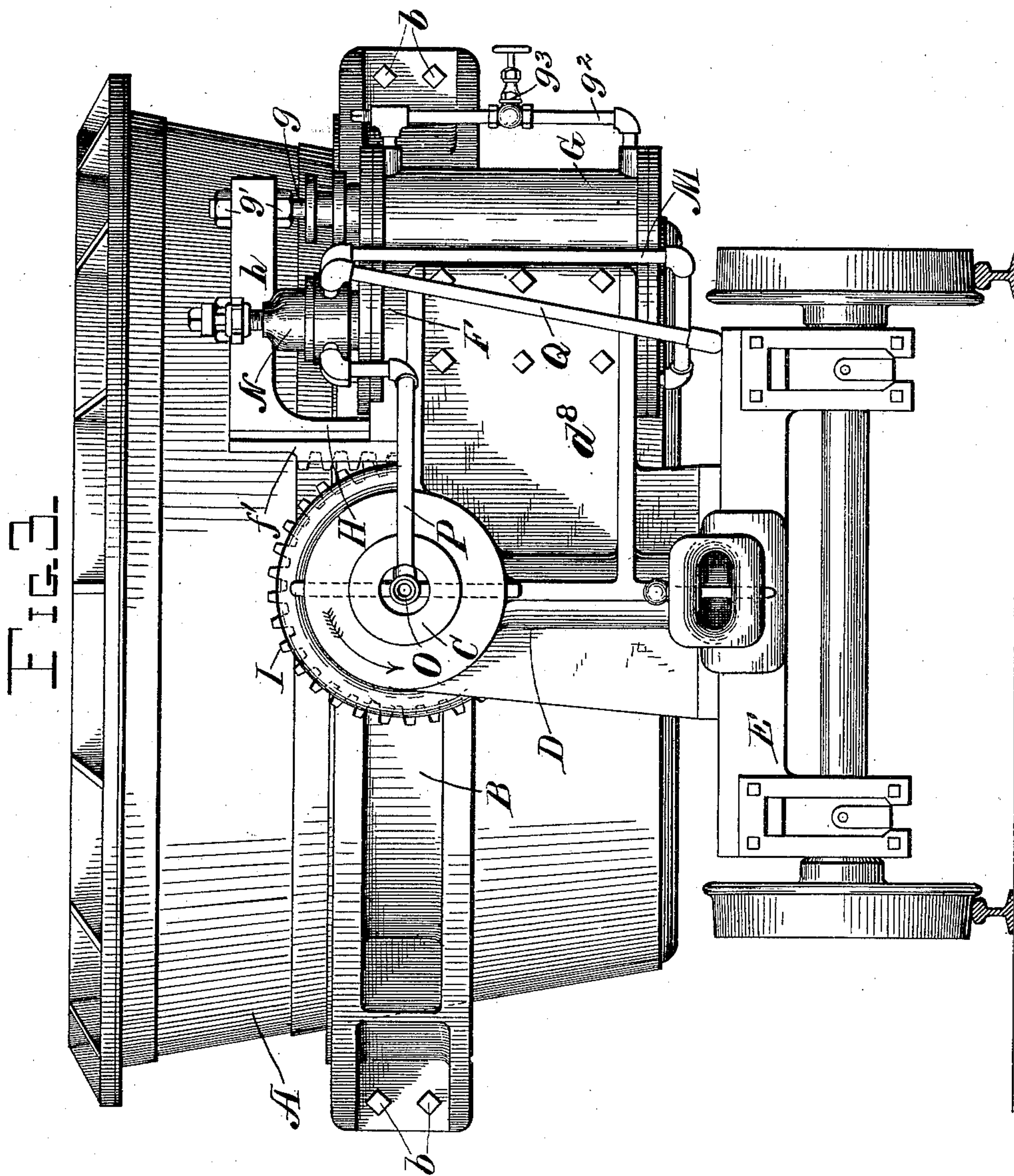
Patented June 19, 1900.

S. STEWART.
DUMPING CAR.

(Application filed Oct. 18, 1899.)

(No Model.)

7 Sheets—Sheet 3.



Witnesses
Rey C. Bowen.
John A. Velt.

Inventor
Samuel Stewart,
by Wilkinson & Fisher,
Attorney S.

No. 652,198.

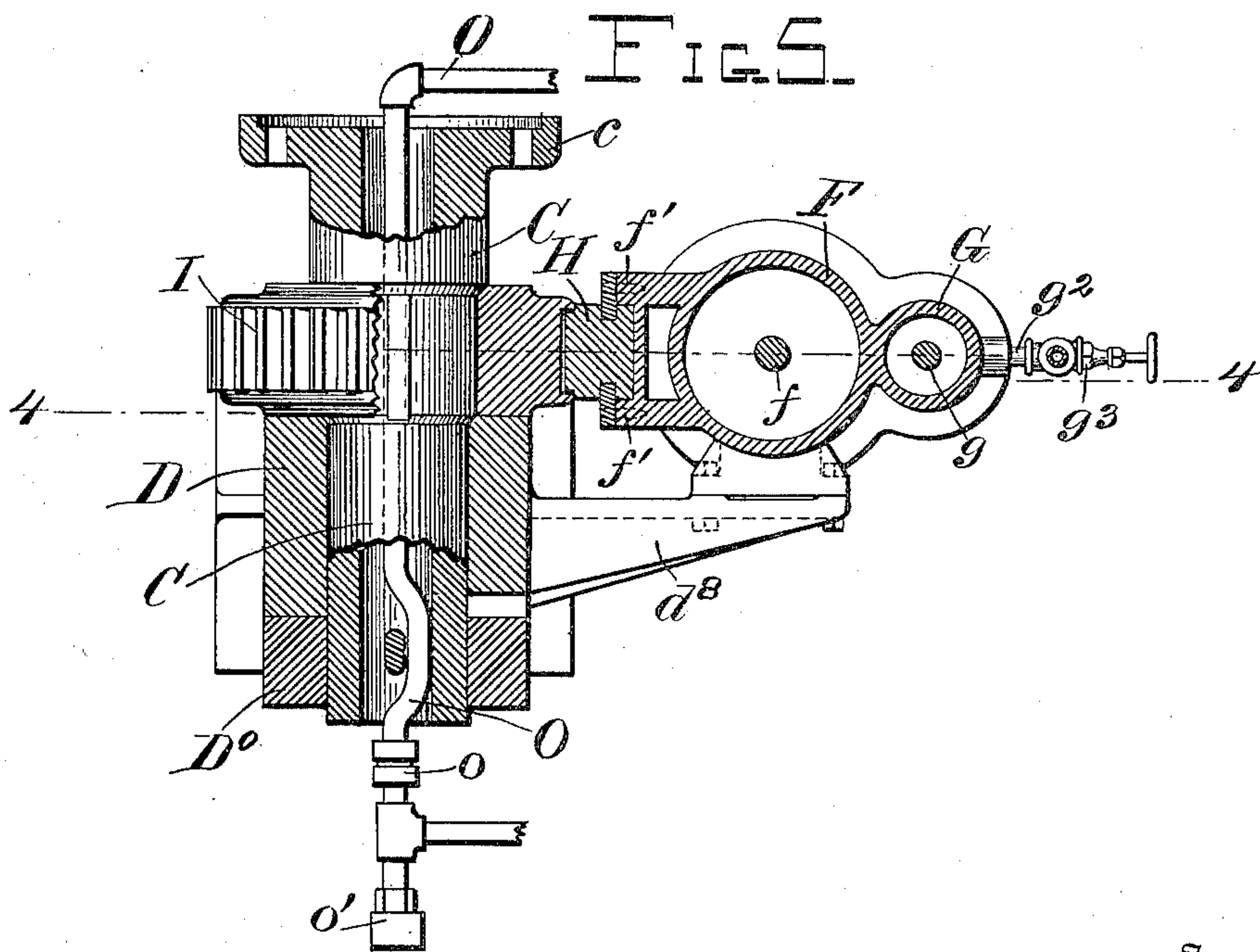
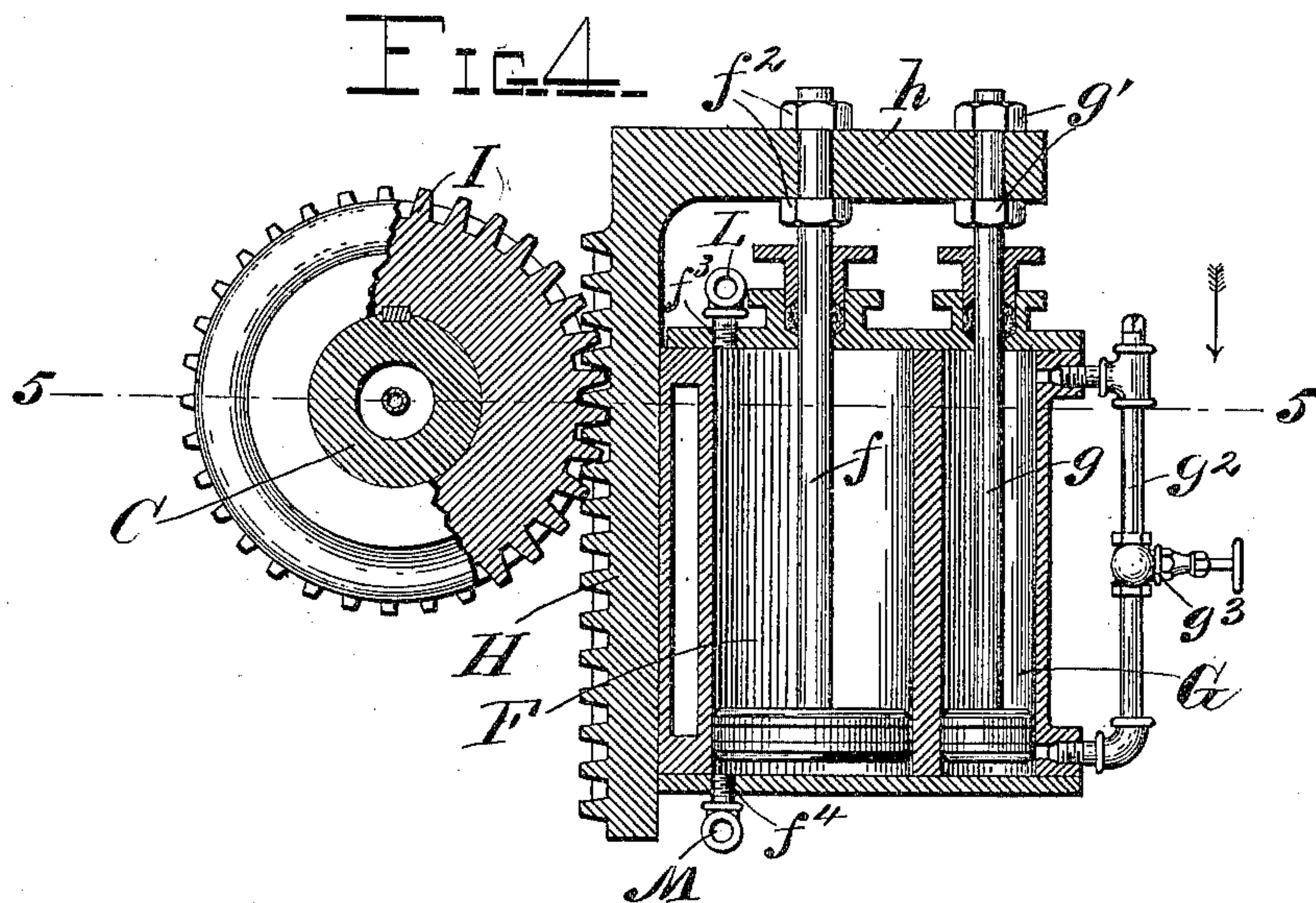
Patented June 19, 1900.

S. STEWART.
DUMPING CAR.

(Application filed Oct. 18, 1899.)

(No Model.)

7 Sheets—Sheet 4.



Witnesses

Wm C. Bowen.
John W. Hall.

Inventor
Samuel Stewart,
by Wilkinson & Fisher,
Attorney's.

No. 652,198.

Patented June 19, 1900.

S. STEWART.
DUMPING CAR.

(Application filed Oct. 18, 1899.)

(No Model.)

7 Sheets—Sheet 5.

FIG. 6.

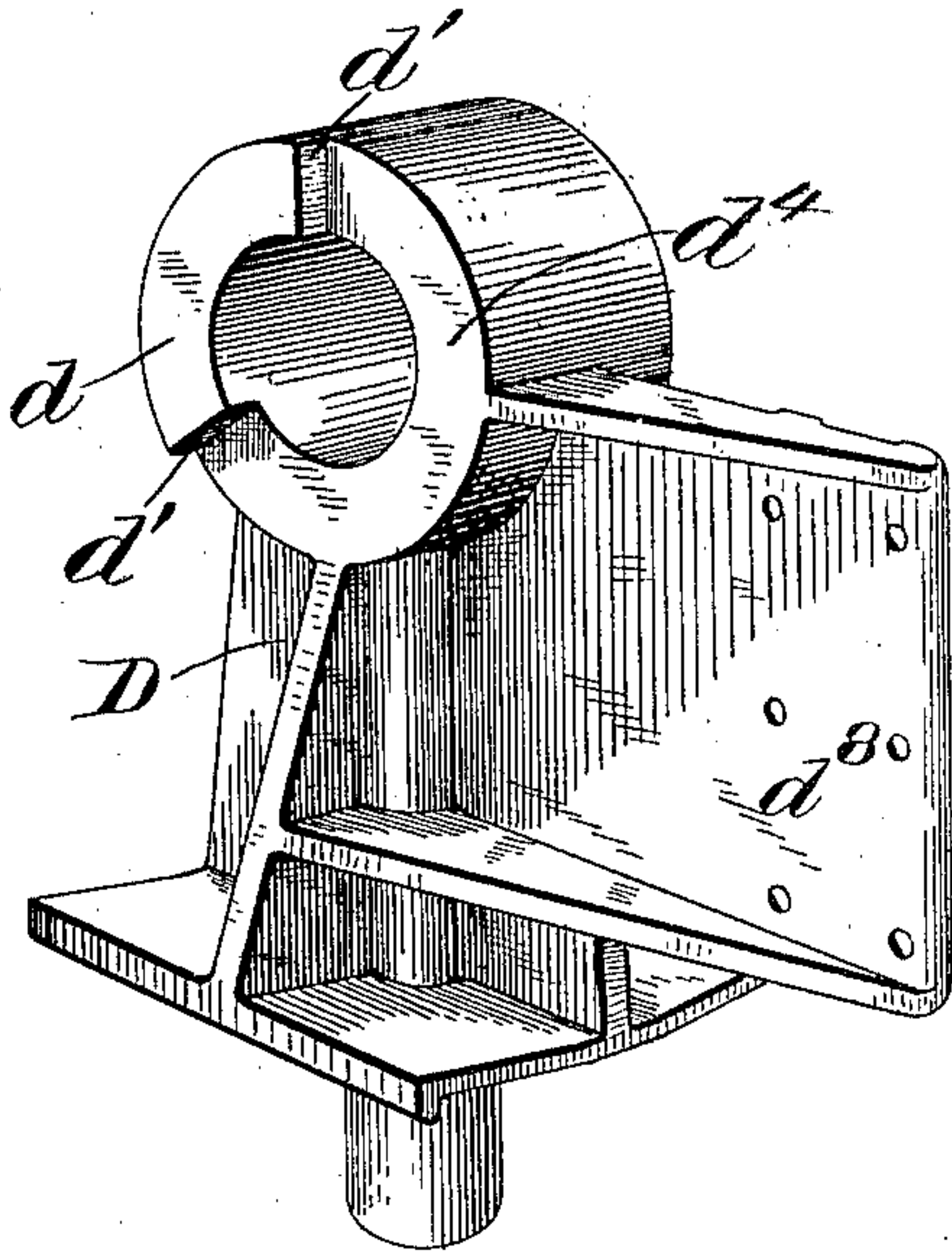


FIG. 7.

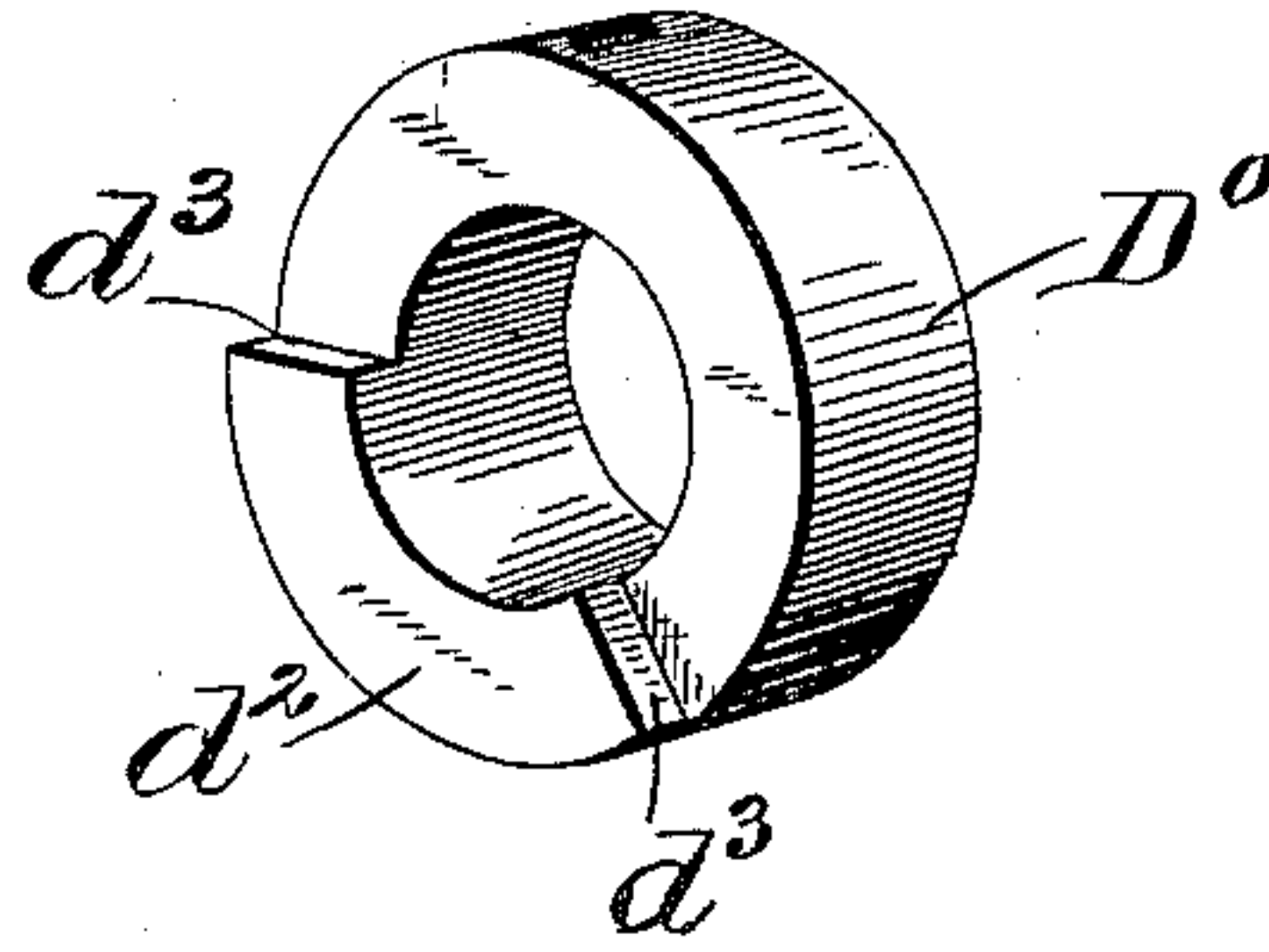


FIG. 8.

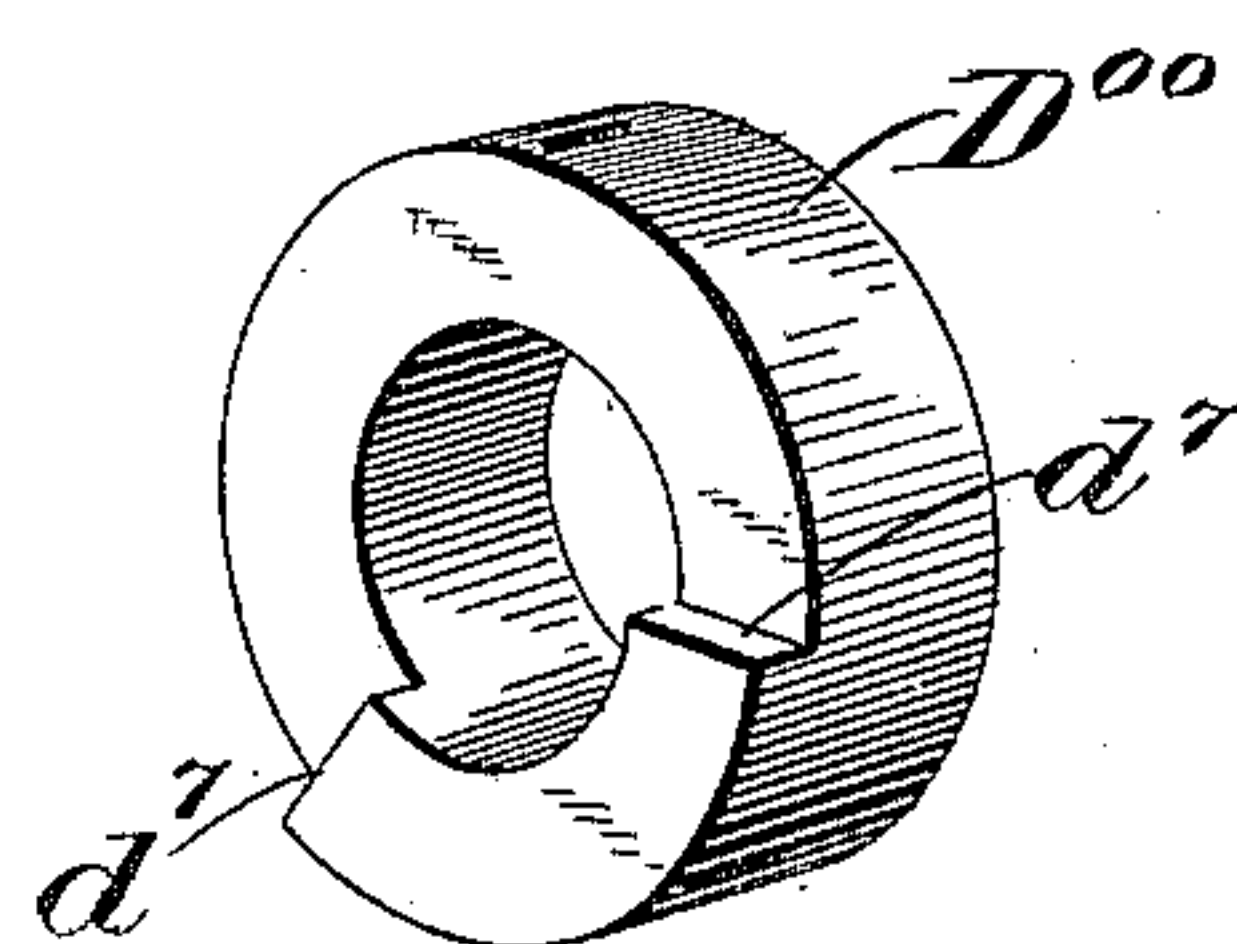
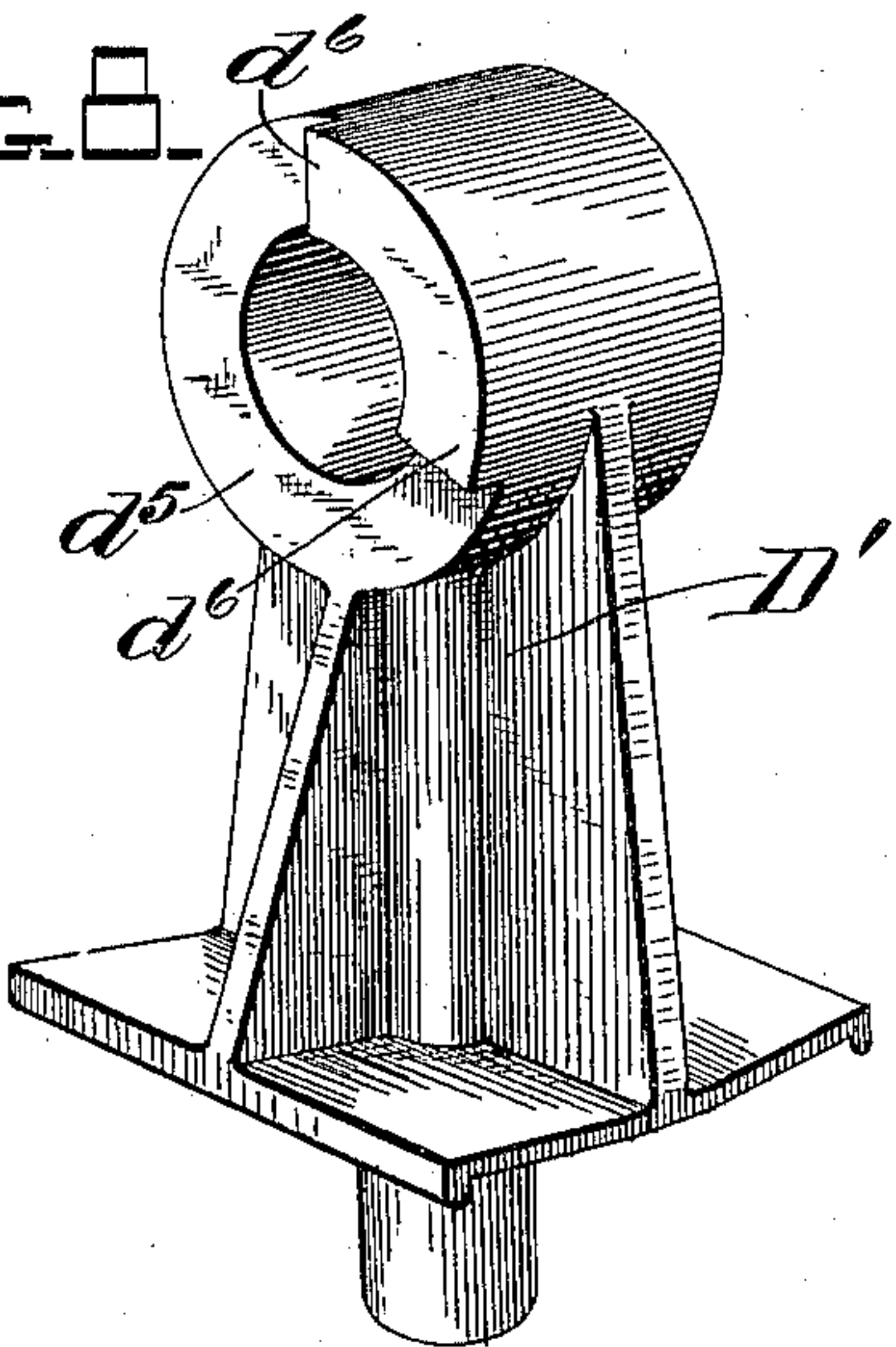


FIG. 9.

Witnesses

Rey C. Bowen.
John W. Holt.

Inventor

Samuel Stewart
by Wilkinson & Fisher,
Attorneys.

No. 652,198.

Patented June 19, 1900.

S. STEWART.
DUMPING CAR.

(No Model.)

(Application filed Oct. 18, 1899.)

7 Sheets—Sheet 6.

Fig. 11.

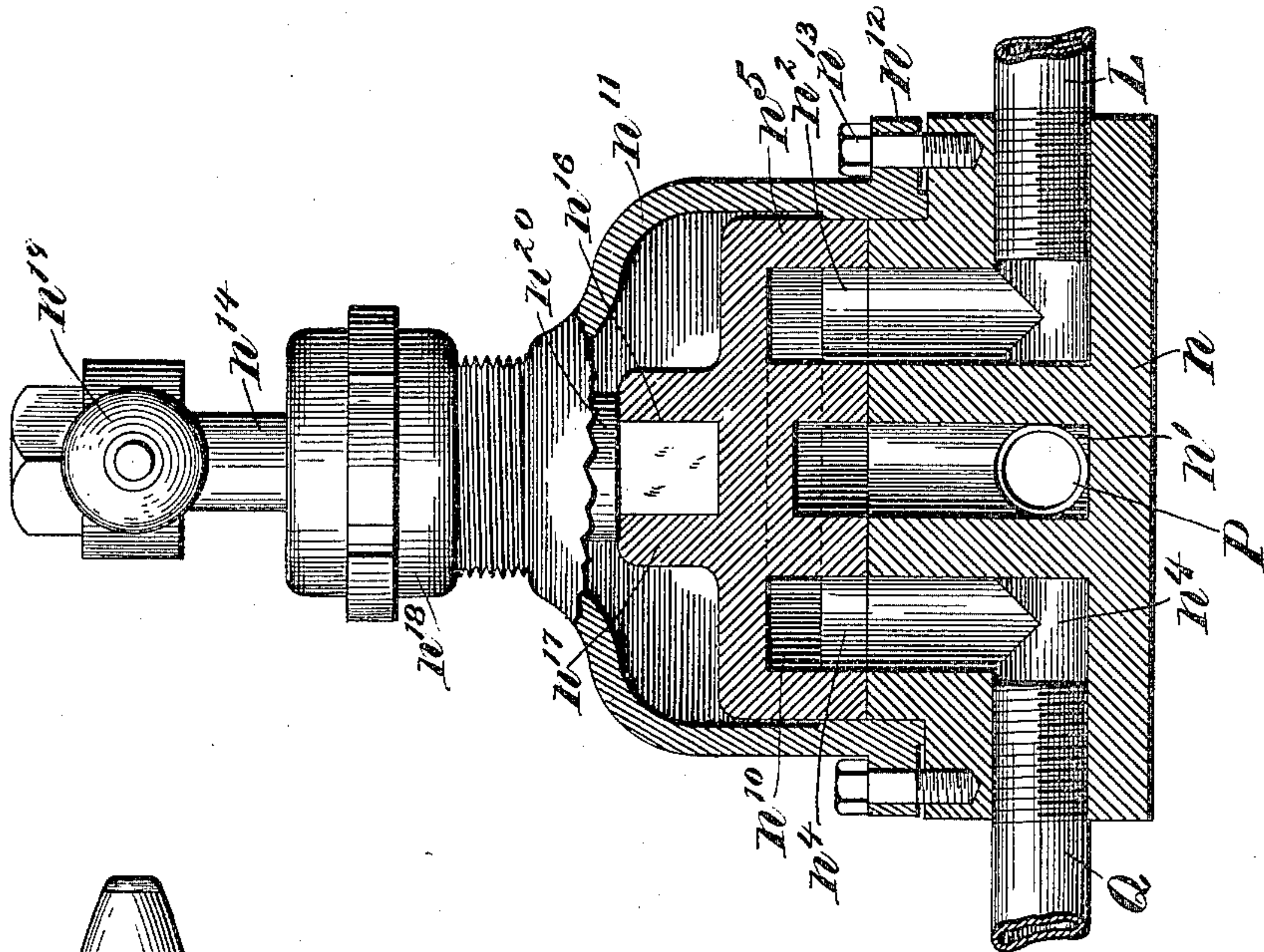
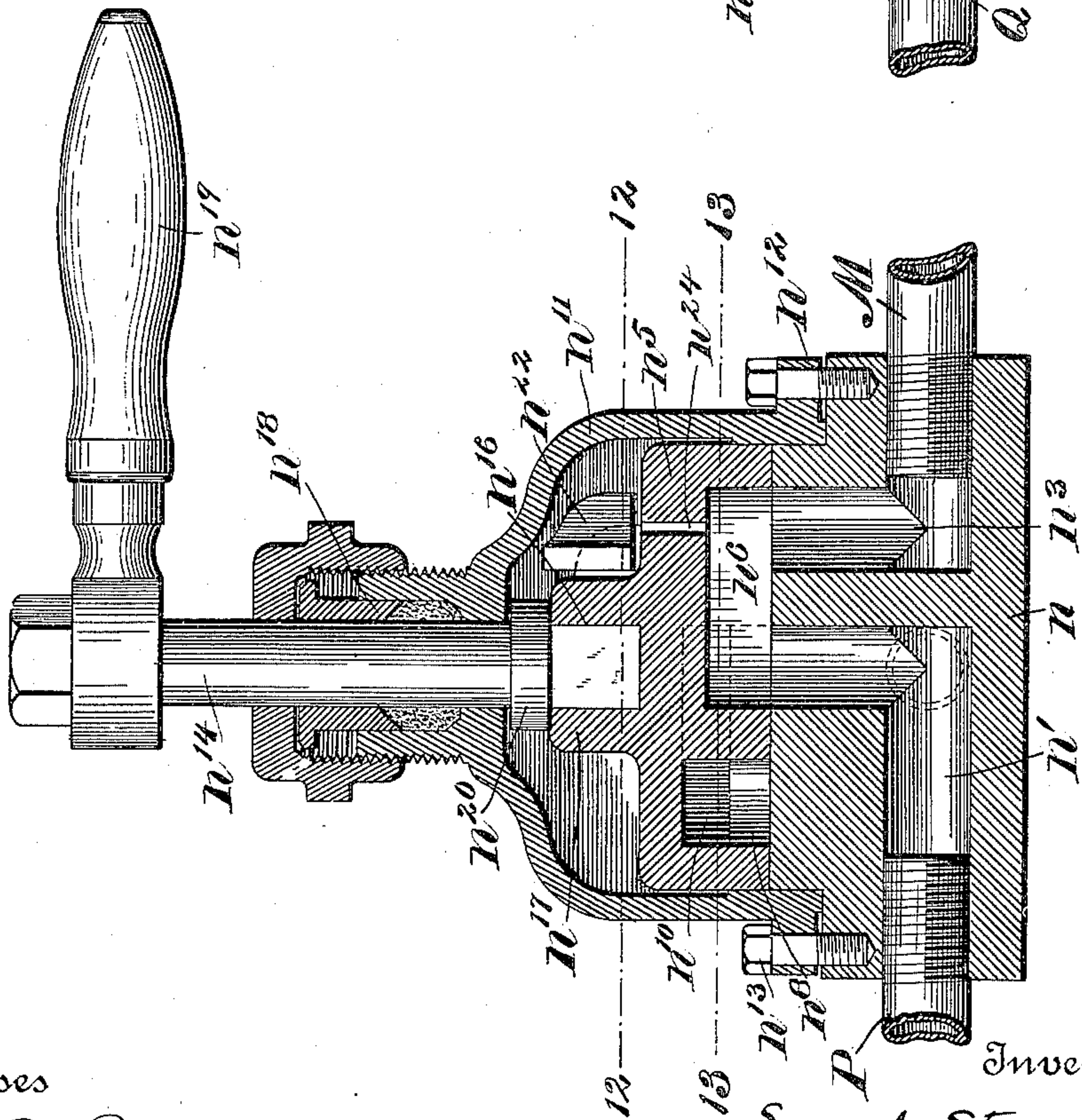


Fig. 10.



Witnesses
Percy C. Bowen.
John N. Valt.

Inventor
Samuel Stewart,
by Wilkinson & Fisher,
Attorneys.

S. STEWART.

DUMPING CAR.

(Application filed Oct. 18, 1899.)

(No Model.)

7 Sheets—Sheet 7.

Fig 12.

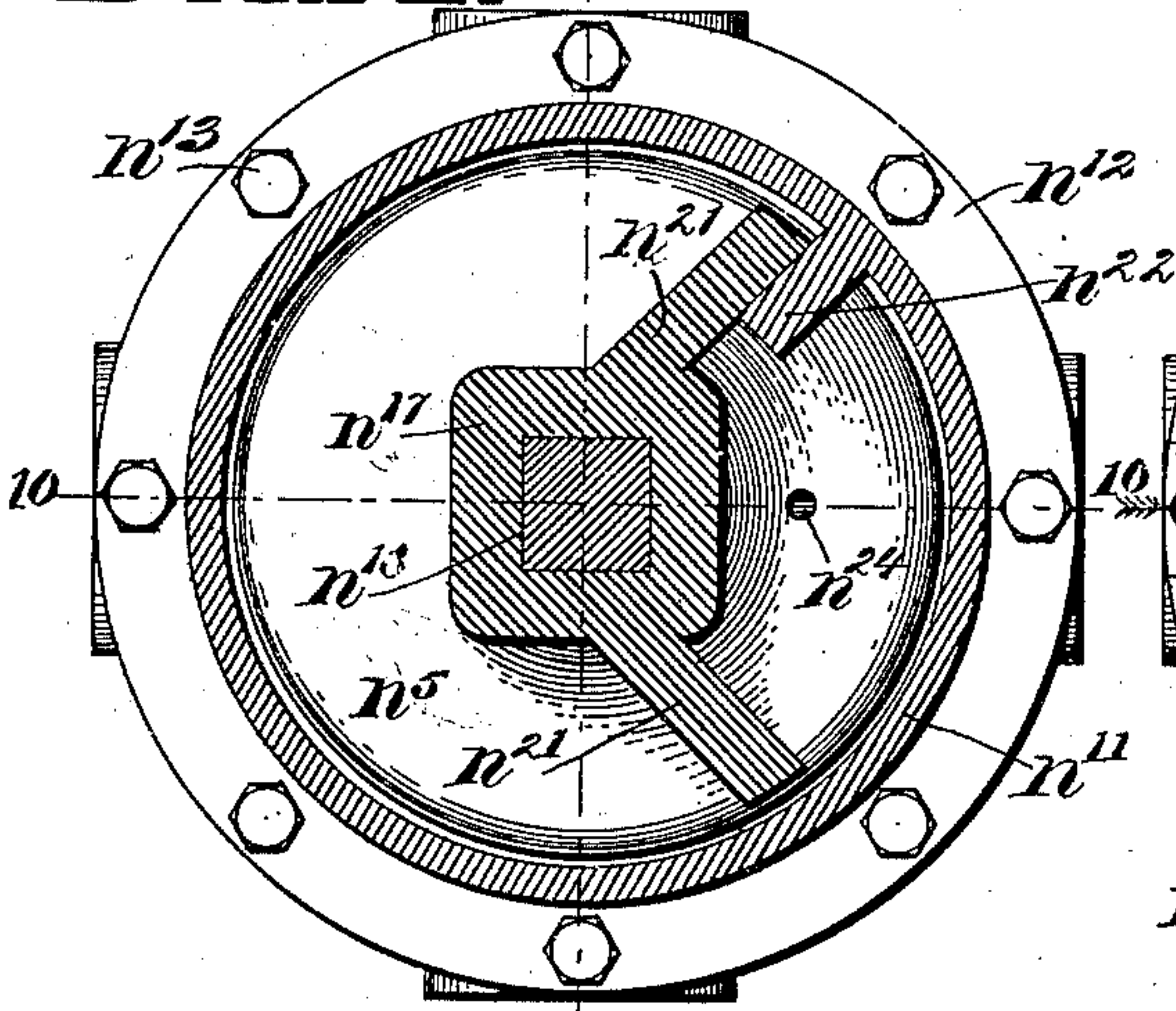


Fig 13.

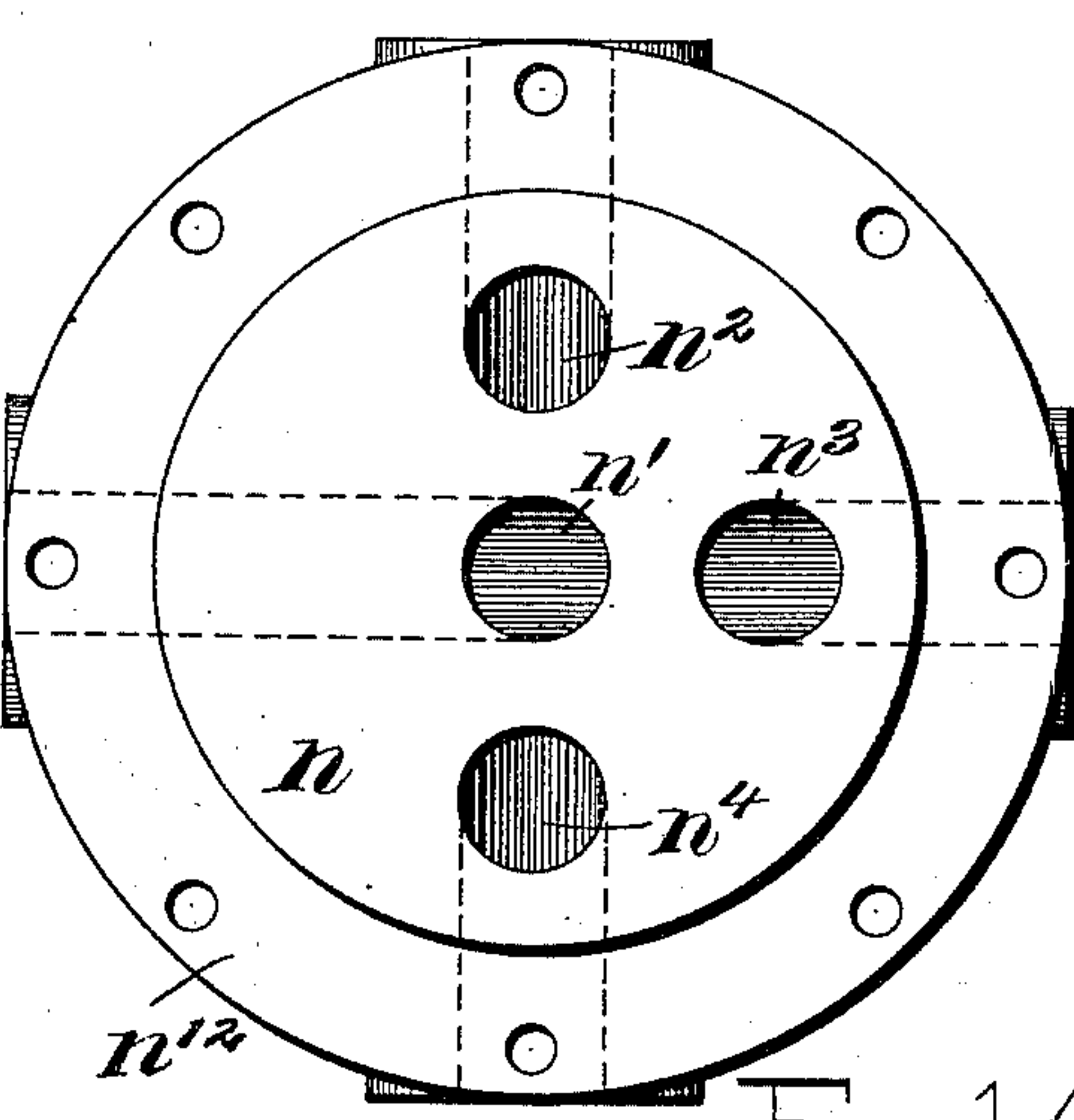
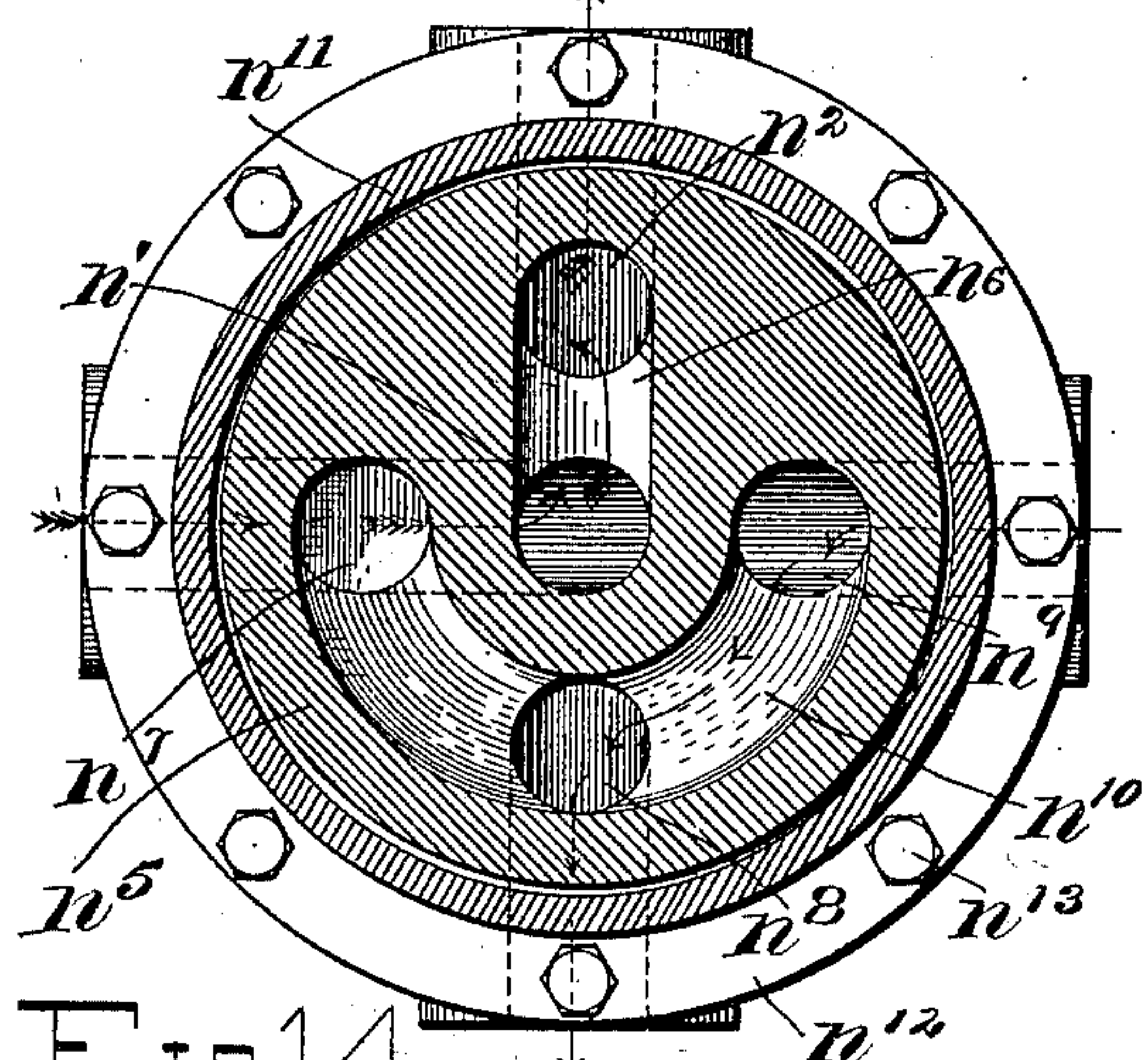
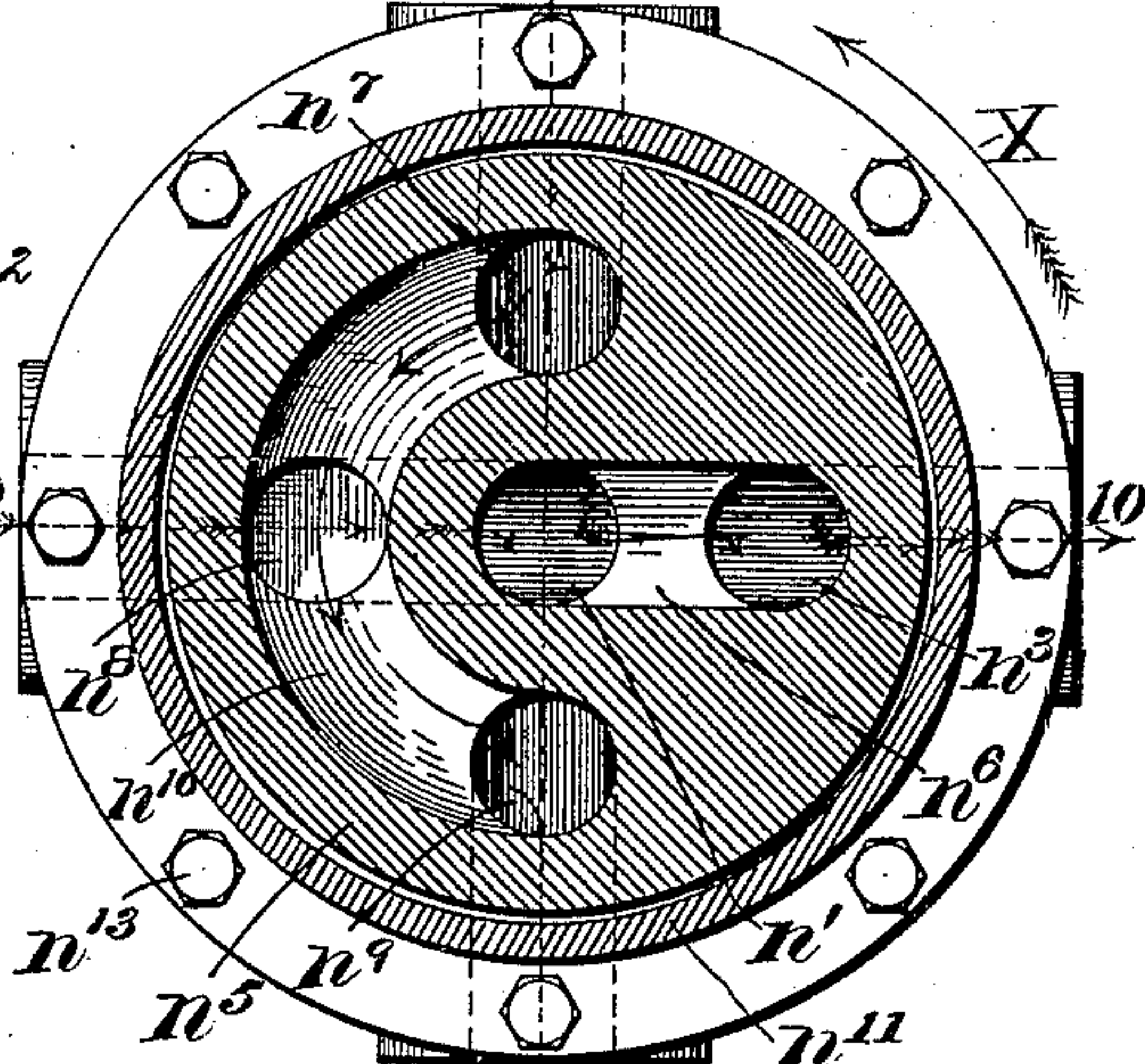
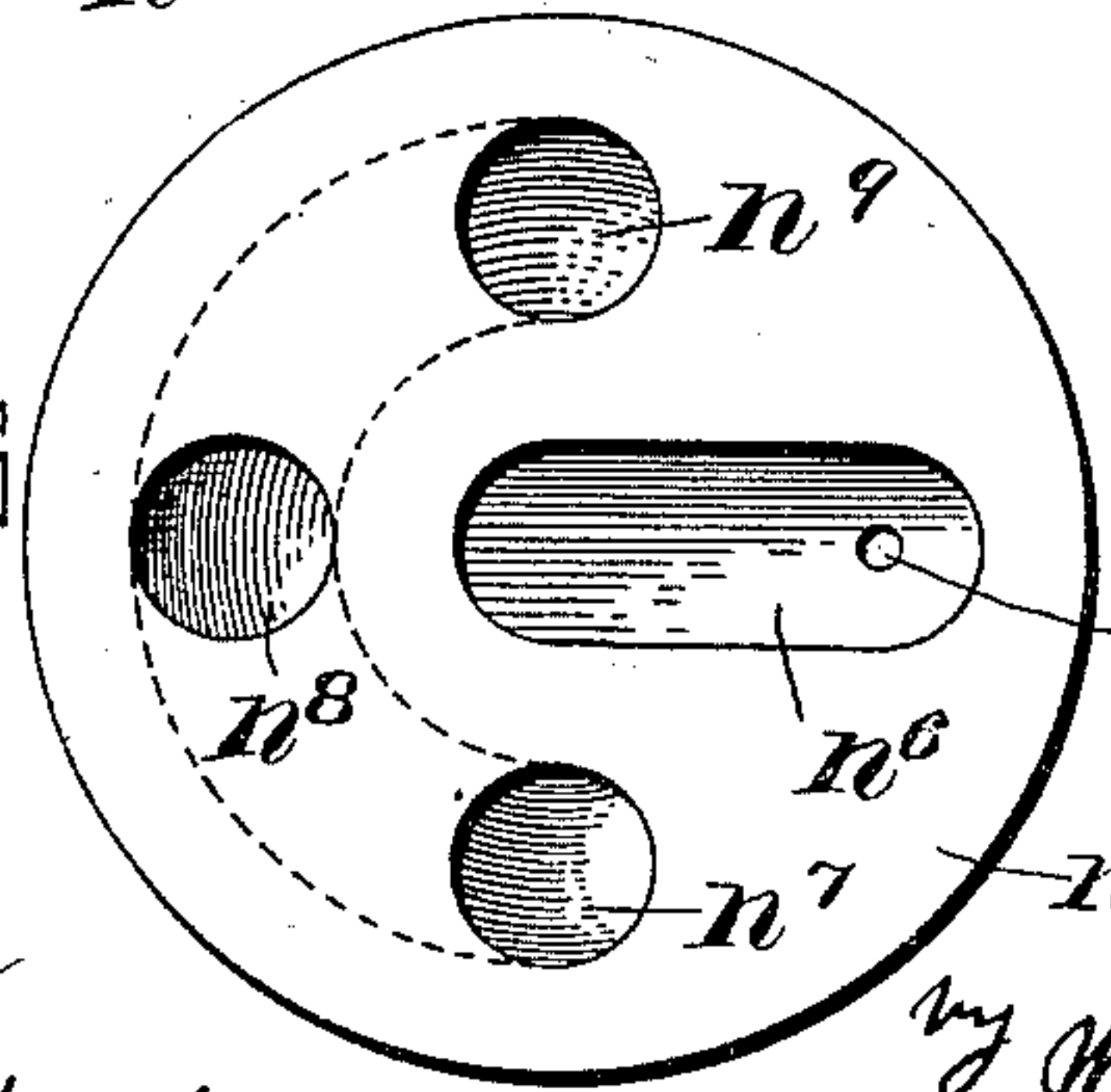


Fig 16



Witnesses
Bryce C. Brown
John H. Holt

Inventor
Samuel Stewart,
by Wilkinson & Fisher,
 Attorneys.

UNITED STATES PATENT OFFICE.

SAMUEL STEWART, OF WOODWARD, ALABAMA, ASSIGNOR OF ONE-HALF
TO FRANK M. EATON, OF SAME PLACE.

DUMPING-CAR.

SPECIFICATION forming part of Letters Patent No. 652,198, dated June 19, 1900.

Application filed October 18, 1899. Serial No. 734,009. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL STEWART, a citizen of the United States, residing at Woodward, in the county of Jefferson and State of Alabama, have invented certain new and useful Improvements in Dumping-Cars; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in dumping-cars, and especially to that class of dumping-cars in which the car-body consists of a slag or cinder pot pivotally mounted between two trucks and adapted to be tilted or dumped by steam, compressed air, or other motive fluid; and the object of this invention is to provide a quick, cheap, and convenient means of handling molten slag, iron, steel, or other substances from blast-furnaces or steel-works, though it will hereinafter be seen that the said car may be used for many other purposes. Besides providing a means by which these cinder or slag pots may be expeditiously and easily dumped, another object of my said invention is to provide additional means for thoroughly ridding the bottom of the pot of its contents. After continued use the bottom of the pot becomes coated with a scale which it becomes necessary to remove. For this purpose a plate is placed in the bottom of the pot and is provided with a stem which extends through the bottom of the pot and is connected to a lever which is in turn operated by the piston of a compressed-air or steam cylinder. In this way by simply admitting steam or air to the cylinder the scale may be quickly and easily broken up and removed.

My said invention consists, further, in the combination of devices and details of construction hereinafter more particularly described and claimed, and in order that the said invention may be more fully described reference will be had to the accompanying drawings, in which—

Figure 1 represents in side elevation a dumping-car embodying my invention. Fig. 2 represents a top plan view of the same. Fig. 3 represents an end elevation of the same. Fig. 4 represents a vertical central sectional view of the dumping and cushioning cylin-

ders and the operative connection with the gear which actuates the pot, the section being taken along the line 4 4, Fig. 5. Fig. 5 represents a section taken along the line 5 5, Fig. 4, looking in the direction of the arrow and showing the manner in which the steam or air pipe passes through the trunnion. Fig. 6 represents the trunnion and cylinder supporting stand in perspective. Fig. 7 is a perspective view of one of the collars for limiting the angle through which the pot turns. Fig. 8 is a perspective view of the trunnion-supporting stand used at the opposite end of the car from the cylinders. Fig. 9 represents in perspective a collar used in connection with the last-mentioned stand for limiting the angle through which the pot turns. Fig. 10 represents a central vertical section of my improved four-way valve used in connection with the dumping-car, the section being taken along the line 10 10, Figs. 12 and 13. Fig. 11 represents a central vertical section of the same valve, taken along the line 11 11, Figs. 12 and 13. Fig. 12 represents a section taken along the line 12 12, Fig. 10, looking down. Fig. 13 represents a section taken along the line 13 13, Fig. 10, looking down. Fig. 14 represents a section taken along the line 13 13, Fig. 10, and looking down, the valve being turned ninety degrees from the position shown in Fig. 13. Fig. 15 represents a top plan view of the valve-seat, and Fig. 16 represents an inverted plan view of the valve.

Similar letters refer to similar parts throughout the several views.

A represents the cinder or slag pot forming the body of the car and made, preferably, of iron or steel plates and lined with plates of cast-iron or other suitable material. This pot is supported in the bail B, which surrounds the pot, and is bolted together, as at b. To the ends of this bail and diametrically opposite each other are bolted the hollow trunnions C and C'. For the purpose of securing these trunnions to the bail they are each provided with a flanged head c and c', respectively, through which pass the bolts b' into the flanged heads b² at each end of the bail. The trunnions C and C' are journaled, respectively, in the stands D and D', mounted upon the car-trucks E E. The outer face of

the head of the stand D is cast with a projection d upon it, forming the shoulders d' , which are about one hundred and twenty degrees apart as measured upon the said projection, and a collar D^0 , having a projection d^2 , which forms the shoulders d^3 , is keyed upon the trunnion C, so that the projection d^2 will engage the face d^4 of the stand. (See Figs. 6 and 7.) The projection d^2 extending one hundred and fifty degrees around the collar, it will be readily seen that the trunnion will be allowed to turn but ninety degrees. The object of this arrangement is to limit the angle through which the pot may be turned, and thereby prevent its being turned too far in dumping, as well as also to form a stop for it when it is brought back to its normal position. The stand C' is similarly constructed with respect to the clutch arrangement, being provided with the projection d^5 , forming shoulders d^6 , which engage the shoulder d^7 of the collar D^{00} . Both of these constructions are most clearly shown in Figs. 6 to 9, inclusive, Fig. 1 showing the stand D' as turned around with respect to the stand D to more clearly show its construction.

F and G represent the dumping and cushion cylinders, respectively. These cylinders are preferably cast together and are bolted to the side extension d^8 of the stand D. H represents a rack which works in a guide f' , cast on the cylinder F, and is provided with a right-angle arm h , to which the piston-rods f and g are secured, the ends of the piston-rods passing through the arm and being held by nuts f^2 and g' . The rack H meshes with a gear-wheel i , keyed on the trunnion C, so that as the rack is raised or lowered the trunnion will be turned and the pot also turned to a corresponding extent, the limit to which the pot is usually tipped being ninety degrees. The rack is thus moved up and down by admitting steam or air into the cylinder F. For this purpose the heads of the cylinder are tapped, as at f^3 and f^4 , and fitted with the pipes L and M, respectively. When steam or air is admitted into one end of the cylinder F—say through the pipe M—the piston will ascend and cause the pot to dump, whereas when it is required to bring the pot back to its normal position the air or steam is admitted through the pipe L into the other end of the cylinder, when the piston will descend, causing the air or steam which had raised it to exhaust through the pipe M. The air or steam is thus admitted or exhausted to and from the cylinder F through a four-way valve N of novel construction, which will hereinafter be described in greater detail. This four-way valve is connected with the main steam or air supply pipe O by the pipe P and is also connected with the exhaust-pipe Q.

The steam or air pipe O is provided with a flexible joint at o and passes through the hollow trunnion C, then through the bail B and around the outside of the pot, and then

through the bail again and out through the other trunnion C, where it is provided with a flexible coupling o' .

When several of these cars are used, forming a train, the main steam or air pipes of all are connected together, the flexible couplings o' being provided for that purpose, so that air or steam from the engine-boiler or other source may be supplied to the whole train.

In order to prevent a jar or sudden shock of any part of the machinery when the dumping operation takes place, the cushion-cylinder G is provided, the piston-rod of which is connected to the rack which operates the gear-wheel I, as hereinbefore described. This cushion-cylinder G is filled with oil or other suitable liquid, and both ends of the cylinder are connected by a pipe g^3 , which is provided with the valve g^3 for regulating the flow of liquid through the pipe from one end of the cylinder to the other. By means of this valve the cushion can be regulated with great precision. Resting upon the bottom of the pot is a plate R, to which is rigidly secured a stem or rod r , which passes through an opening r' in the bottom of the pot. The lower end of the stem r is pivoted to one end of a lever r^2 , which is fulcrumed in a bracket r^3 , secured to the pot. The other end of the lever r^2 is pivoted to the piston-rod s of the cylinder S. This cylinder S is bolted to the bail B, as at s' , and is connected at each end through the pipes T and U with the four-way valve N' . This valve is similar to the valve N and is connected by the pipe V with the main steam or air pipe O, the said pipe V being provided with a valve o^2 , by which the connection from the main steam or air pipe may be cut off at will. The exhaust steam or air passes from the valve N' out through the pipe W. If a crust has formed over the bottom of the pot and it is desired to break it up, steam or air is admitted into the upper end of the cylinder S' by operating the valve N' . This will force the piston of the cylinder down, and this will in turn force the plate R up, which will break the crust formed over it. Then by turning the handle of the valve N' ninety degrees in the opposite direction the upper end of the cylinder is open to exhaust, while steam or air is admitted into the other end, and this, as will be readily seen, will bring the plate back to its normal position upon the bottom of the pot. It will thus be seen from the foregoing description that the cinder-pot, however heavy its contents are, may be operated by a single attendant by operating the valve N. The same attendant may also operate the valve N' , both being near each other, and thus easily remove the scale or any matter that tends to stick to the bottom of the pot, all of which renders the handling of the material much easier than is at present the practice.

The four-way valve N is shown in detail in Figs. 10 to 16, inclusive. The base or valve-seat n is provided with four ports n^1, n^2, n^3 , and

n^4 , the port n' connecting with the air or steam supply pipe P, the port n^2 with the cylinder-pipe L, the port n^3 with cylinder-pipe M, and the port n^4 with the exhaust-pipe Q, the said pipes being screwed into these ports, as shown. The port n' , which connects with the supply-pipe, passes up through the center of the valve-seat, while the other ports are ninety degrees from each other and arranged around the central supply-port. (See Fig. 15.) The valve n^5 rests upon the valve-seat n and is provided with a transversely-extending chamber n^6 , forming a cavity in its lower face, the length of the chamber being equal to the sum of the diameters of the admission-port and one of the other ports plus the distance between the two. The valve is also provided with three ports n^7 , n^8 , and n^9 , which register with the ports n^2 , n^3 , and n^4 of the valve-seat. These ports n^7 , n^8 , and n^9 do not pass all the way through the valve, but communicate with each other by means of an interior annular passage n^{10} . The valve n^5 is inclosed in a casing n^{11} , which is provided at its lower end with an annular flange n^{12} , through which the bolts n^{13} pass into the valve-seat to hold the two together. The upper face of the valve-seat fits accurately into the casing, passing up into the latter, as shown. The valve is provided with the valve-stem n^{14} , the lower end of which fits into a cavity n^{16} in an extension n^{17} on the top of the valve. The stem then passes up through the stuffing-box n^{18} and is provided at its upper end with a handle n^{19} , by which it is operated. The said stem has also an annular ring or flange n^{20} upon it, which is located just between the valve-casing and the top of the valve, which keeps the latter from becoming displaced. The angular or rotary movement of the valve is limited by the stops n^{21} , which bring up against the lug n^{22} of the casing. The valve n^5 is held down upon its seat by the pressure of the steam or air above it, which passes through the opening n^{22} . If we suppose the valve to be in the position shown in Figs. 10, 11, 12, and 13, the steam or air will enter through the pipe P, will pass through the port n' , through the passage n^6 , and out through the port n^3 and pipe M to one end of the cylinder or other device with which the valve is used. In this position, as shown most clearly in Fig. 13, it will be seen that the cylinder-pipe L is in communication with the cylinder-pipe port n^2 and exhaust-port n^4 , from which it will be seen that while steam or air is being admitted through one of the cylinder-pipes it is being exhausted from the other. If the valve is now turned through an angle of forty-five degrees in the direction of the arrow X, Fig. 13, the steam or air will be entirely cut off, while by turning the valve forty-five degrees farther in the same direction the cavity or chamber n^6 of the valve will lap the port n^2 instead of port n^3 , when steam or air will be admitted through the port n^2 and exhausted from the port n^3 .

It is obvious that the invention herein described is capable of many modifications, which may be made without departing from the spirit of the invention. Thus, for example, while I have shown and described a cinder or slag pot of a certain type as forming the car-body I do not confine my invention to this specific structure, as car-bodies of many other kinds may also be used in connection with the dumping apparatus herein described.

What I claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. In a dumping-car, a pivotally-mounted car-body, a cylinder and air or steam pipes connected therewith, a rack and pinion forming an operative connection between the piston-rod of said cylinder and said car-body, whereby the said car-body may be tilted, substantially as described.

2. In a dumping-car, a pivotally-mounted car-body, a stationary cylinder, and air or steam supply pipes connected therewith, operative connection between the piston-rod of said cylinder and said car-body, whereby the said car-body may be tilted, and a cushioning-cylinder containing a fluid adapted to retard the tilting movement of said body, and a pipe connecting the ends of said cushion-cylinder for conveying the cushioning fluid, substantially as described.

3. In a dumping-car, a tilting car-body provided with trunnions upon which it is mounted, a cylinder, and air or steam supply pipes connected therewith, a rack and pinion forming an operative connection between the piston-rod of said cylinder and one of said trunnions, whereby the said car-body may be tilted, and means for cushioning the tilting movement of said car-body, substantially as described.

4. In a dumping-car, a pivotally-mounted car-body, a dumping-cylinder and air or steam supply pipes connected therewith, operative connection between the piston-rod of said cylinder and said car-body, whereby the said car-body may be tilted, a cushioning-cylinder containing a fluid for cushioning the tilting movement of the said car-body, a pipe connecting the ends of said cushion-cylinder and means located in said pipe for varying the cushion of said cylinder, substantially as described.

5. In a dumping-car, a pivotally-mounted car-body, a dumping-cylinder, and air or steam supply pipes connected therewith, a rack and pinion forming an operative connection between the piston-rod of said cylinder and said car-body, whereby the said car-body may be tilted, a cushioning-cylinder having its piston-rod connected with the piston-rod of the said stationary cylinder, substantially as described.

6. In a dumping-car, a pivotally-mounted car-body, a stationary cylinder, and air or steam pipes connected therewith, operative

connection between the piston-rod of said cylinder and said car-body, whereby the said car-body may be tilted, a cushioning-cylinder for cushioning the tilting movement of the car-body, a pipe connecting the ends of said cushioning-cylinder with each other and a valve located in said pipe, substantially as described.

7. In a dumping-car, a tilting car-body, and trunnions supporting the same, a gear-wheel mounted on one of said trunnions, a rack meshing with said gear-wheel, a stationary cylinder having air or steam pipes connected therewith, and operative connection between the piston-rod of said cylinder and said rack, substantially as described.

8. In a dumping-car, a tilting car-body, and trunnions supporting the same, a gear-wheel mounted on one of said trunnions, a rack meshing with said gear-wheel, a stationary cylinder having air or steam pipes connected therewith, and operative connection between the piston-rod of said cylinder and said rack, whereby the said car-body may be tilted, and a cushioning-cylinder having its piston-rod connected with said rack and acting to cushion the tilting movement of said car-body, substantially as described.

9. In a dumping-car, a pivotally-supported car-body, a dumping-cylinder, and air or steam supply pipes connected therewith, a rack and pinion forming an operative connection between the piston-rod of said cylinder and said car-body, whereby the said car-body may be tilted, and a four-way valve connected to the steam or air pipes of said cylinder and with the source of steam or air supply and adapted to admit steam or air into one end of said cylinder while allowing it to exhaust from the other end, substantially as described.

10. In a dumping-car, a tilting car-body, and trunnions supporting the same, a gear-wheel mounted on one of said trunnions, a rack meshing with said gear-wheel, a stationary cylinder having air or steam pipes connected therewith, operative connection between the piston-rod of said cylinder and said rack, and a four-way valve connected to said steam or air pipes and admitting air or steam to one end of said cylinder while allowing it to exhaust from the other end, substantially as described.

11. In a dumping-car, the combination with a receptacle forming the car-body, a frame in which the said receptacle is mounted, a hollow trunnion secured to each end of said frame, a stationary cylinder, steam or air supply pipes connected with said cylinder, operative connection between the piston-rod of said cylinder and one of said trunnions, whereby the said car-body may be tilted, a main steam or air pipe passing through said trunnions, around said frame and connected to the pipes of said cylinder, substantially as described.

12. In a dumping-car, the combination with

a cinder or slag pot forming the car-body, a bail or supporting-frame in which the said pot is mounted, a hollow trunnion secured to each end of the said supporting-frame or bail, a gear-wheel carried upon one of said trunnions, a rack meshing with said gear-wheel, a dumping-cylinder having its piston-rod connected to said rack, steam or air pipes connected to said cylinder, and means for governing the flow of steam or air to and from said cylinder whereby the said car-body may be tilted and returned to its initial position, substantially as described.

13. In a dumping-car, the combination with a cinder or slag pot forming the car-body, a bail or supporting-frame in which the said pot is mounted, a hollow trunnion secured to each end of the said supporting-frame or bail, a gear-wheel carried upon one of said trunnions, a rack meshing with said gear-wheel, a dumping-cylinder having its piston-rod connected to said rack, steam or air pipes connected to said cylinder, means for governing the flow of steam or air to and from said cylinder, whereby the said car-body may be tilted and returned to its initial position, and a cushioning-cylinder having its piston-rod connected to said rack, whereby the tilting movement of the car-body is cushioned, substantially as described.

14. The combination with a car-body, of a plate located in the bottom of said car-body, a stationary cylinder, air or steam pipes connected to said cylinder, and operative connection between the piston-rod of said cylinder and said plate, whereby the said plate may be raised or lowered for the removal of material from the bottom of the car-body, substantially as described.

15. The combination with a car-body, of a plate located in the bottom of said car-body, a stationary cylinder, steam or air pipes connected with said cylinder, a lever connecting the piston-rod of said cylinder with said plate, whereby the said plate may be raised or lowered for the removal of material from the bottom of said car, substantially as described.

16. The combination with a car-body, of a plate located in the bottom of said body, a stem secured to said plate and extending through the bottom of said car-body, a lever connected to said stem, a cylinder having its piston-rod connected to said lever, steam or air pipes connected to said cylinder, and a valve for controlling the admission of steam or air into said cylinder, whereby the said plate may be raised or lowered to remove material from the bottom of said car-body, substantially as described.

17. In a dumping-car, the combination with a cinder or slag pot forming the car-body, of means for tilting said pot, a plate located in the bottom of said pot, a cylinder carried by said car, operative connection between the piston-rod of said cylinder and said plate, and means for admitting steam or air into said cylinder and exhausting the same there-

from; whereby the said plate may be raised in removing material from the bottom of said pot, substantially as described.

18. In a dumping-car, a tilting car-body, 5 and trunnions supporting the same, a gear-wheel mounted on one of said trunnions, a rack meshing with said gear-wheel, a cylinder having air or steam pipes connected therewith, and operative connection between the 10 piston-rod of said cylinder and said rack, substantially as described.

19. The combination with a car-body, of a plate located in the bottom of said car-body, 15 a cylinder, air or steam pipes connected to said cylinder, and operative connection between the piston-rod of said cylinder and said plate, whereby the said plate may be raised or lowered for the removal of material from the 20 bottom of the car-body, substantially as described.

20. The combination with a car-body, of a plate located in the bottom of said car-body, a cylinder, steam or air pipes connected with said cylinder, a lever connecting the piston-

rod of said cylinder with said plate, whereby 25 the said plate may be raised or lowered for the removal of material from the bottom of said car, substantially as described.

21. In a dumping-car, the combination with a receptacle forming the car-body, trunnions 30 supporting said receptacle, stands provided with journal-bearings in which said trunnions are mounted, said stands being provided with projecting shoulders, collars mounted on said trunnions and adapted to engage said shoul- 35 ders and thus limit the angle through which the said car-body may be dumped, a dumping-cylinder and operative connection between the piston of said cylinder and said car-body, whereby the latter may be dumped, 40 substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

SAMUEL STEWART.

Witnesses:

FRANK M. EATON,
A. AITCHESON.