

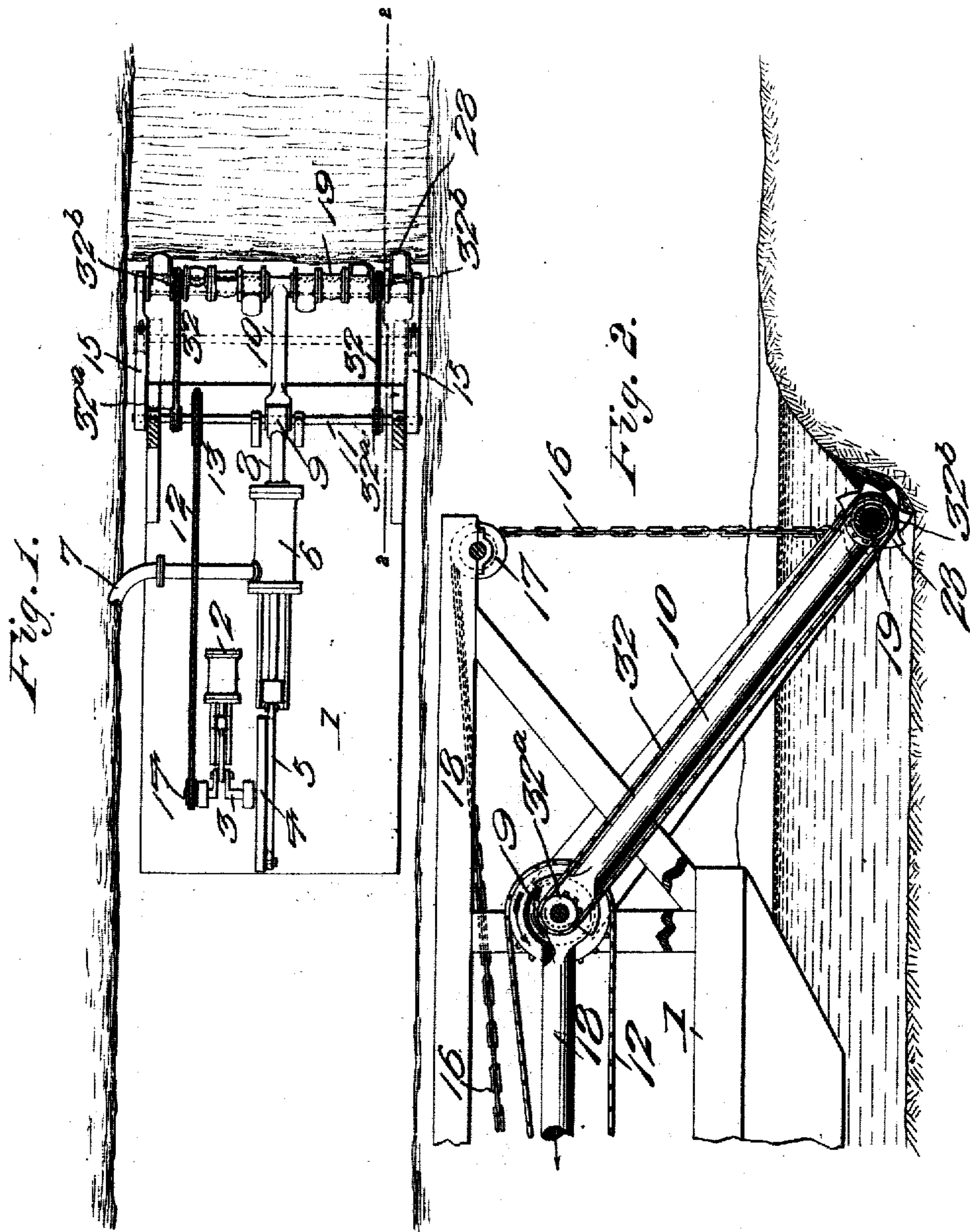
No. 822,863.

PATENTED JUNE 5, 1906.

C. N. NEWCOMB.
SUCTION DREDGE.

APPLICATION FILED NOV. 28, 1905.

4 SHEETS—SHEET 1.



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4 SHEETS—SHEET 2.

Fig. 3.

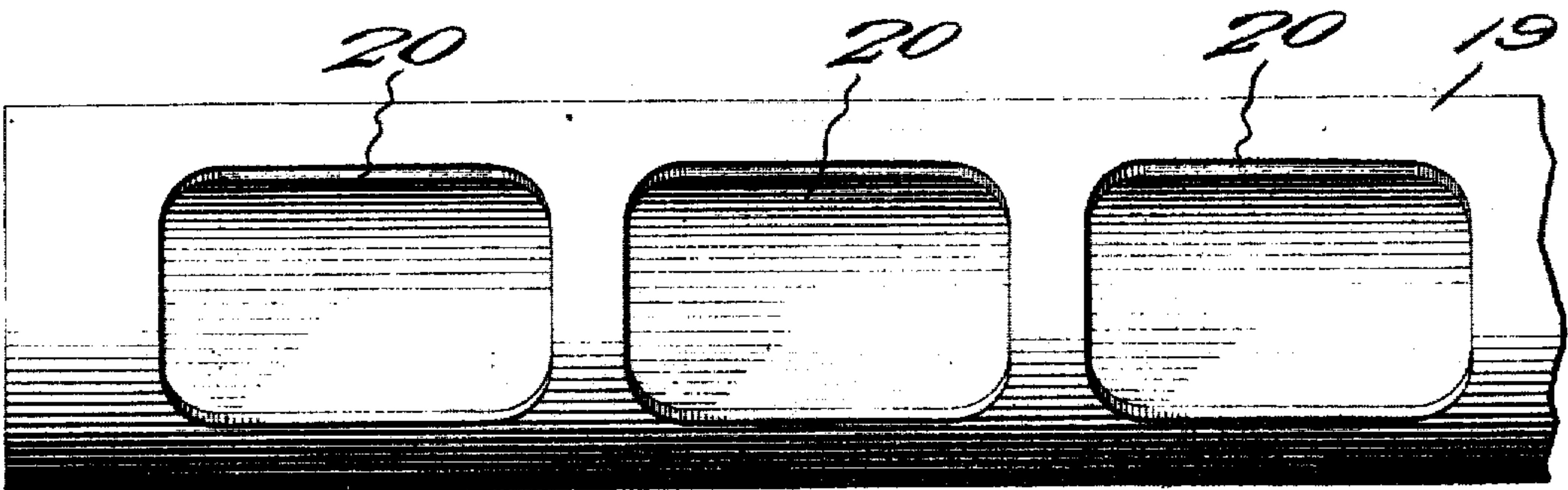


Fig. 7.

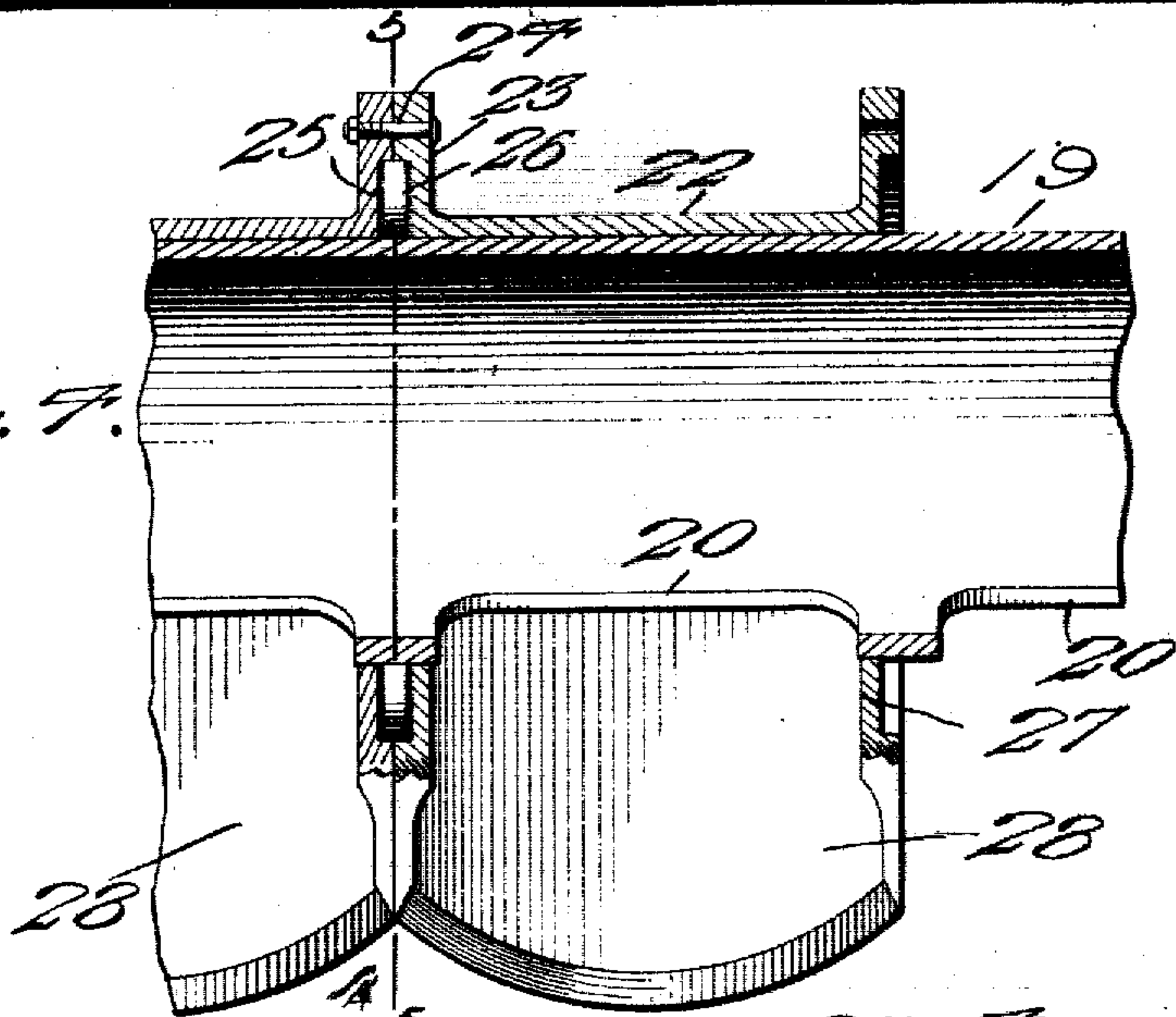
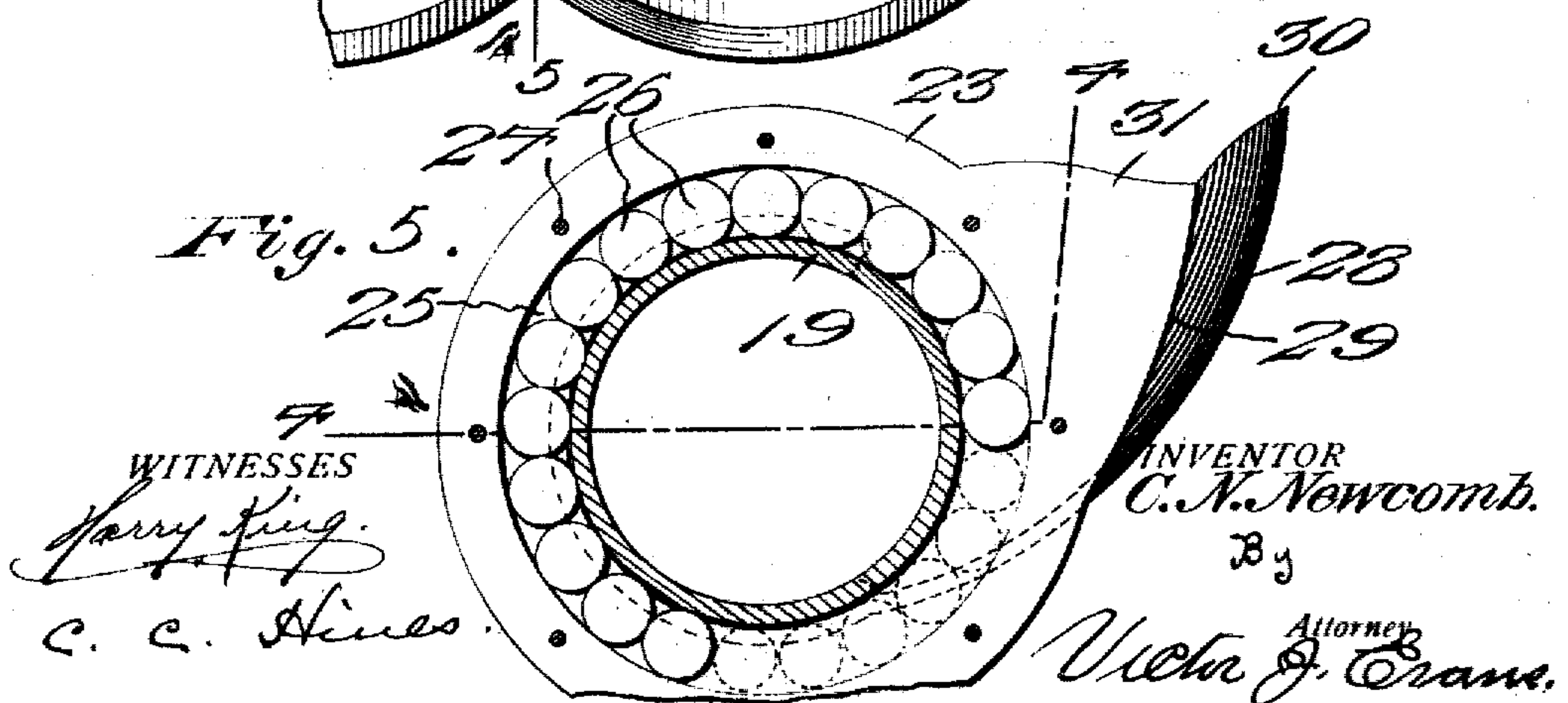


Fig. 5.



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4 SHEETS—SHEET 3.

Fig. 6.

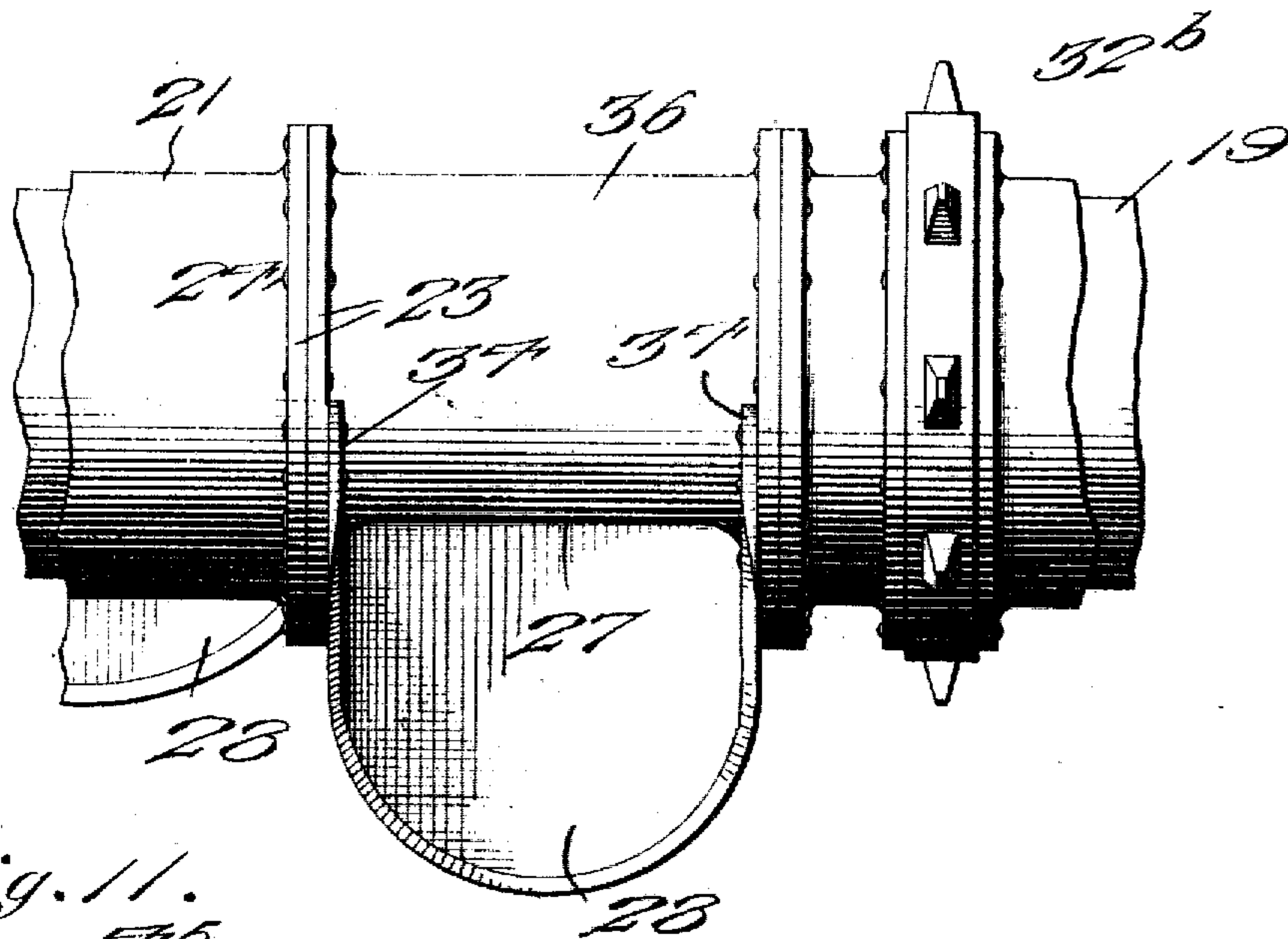


Fig. 11.

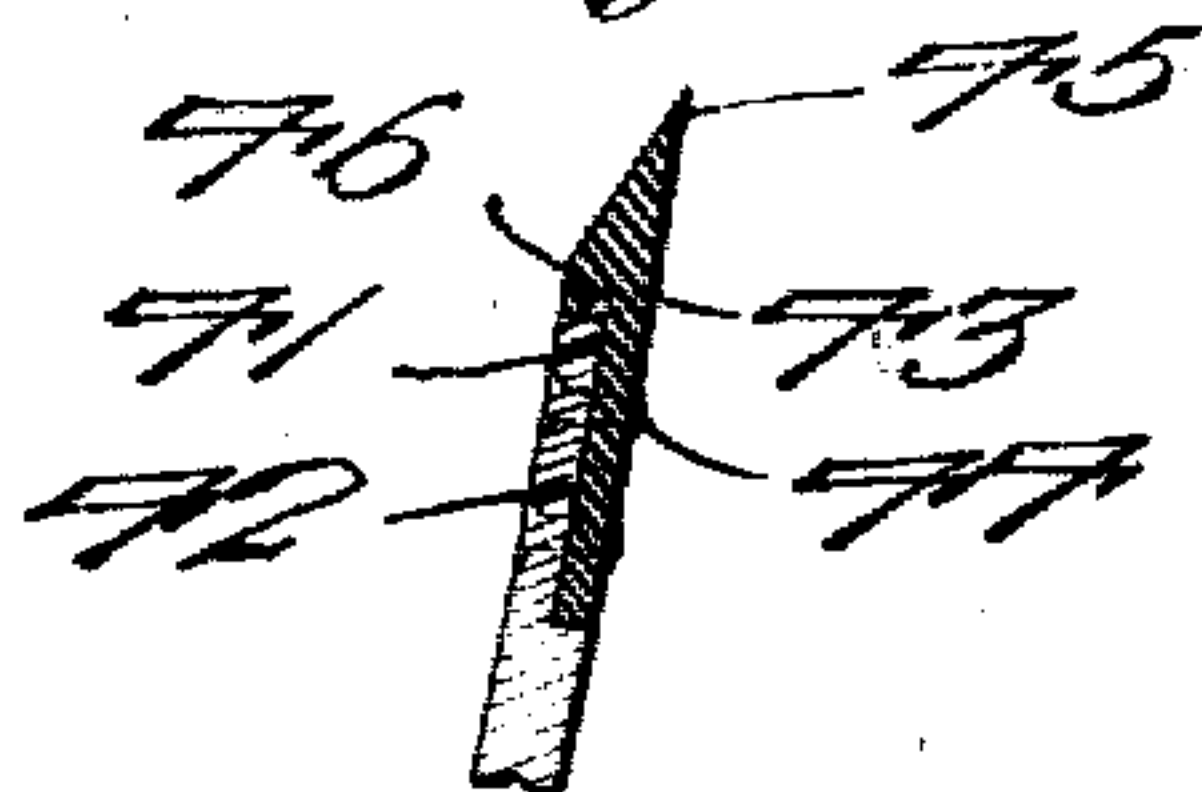
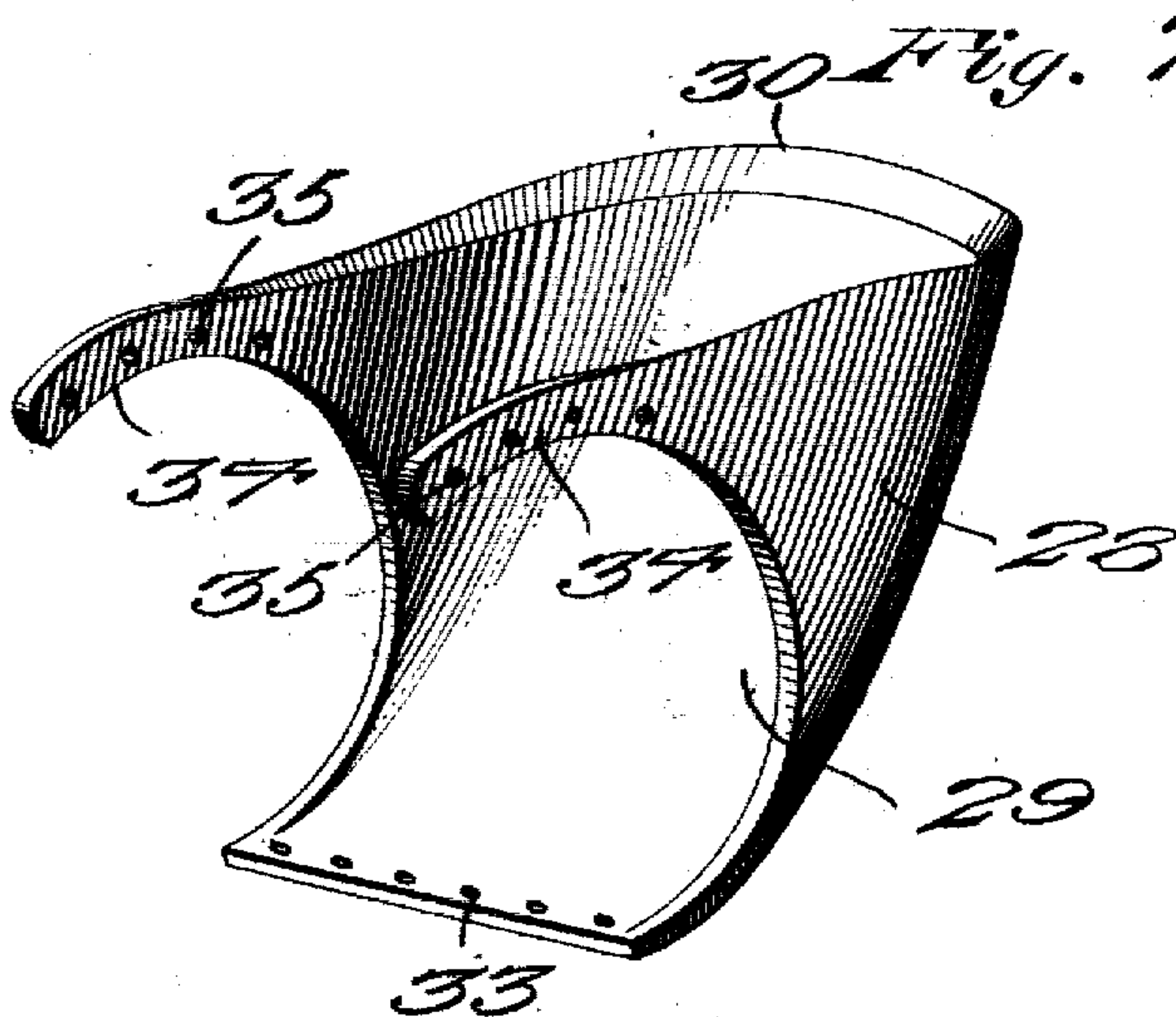


Fig. 7.



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4 SHEETS—SHEET 4.

Fig. 8.

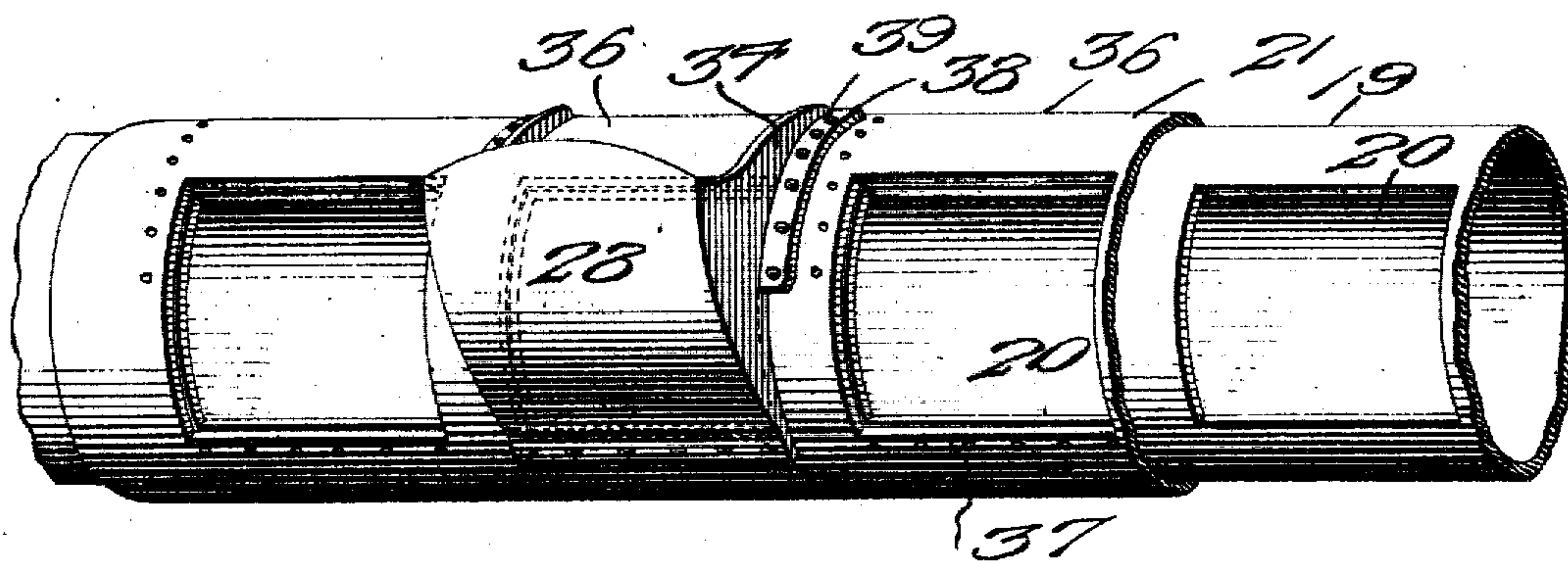


Fig. 9.

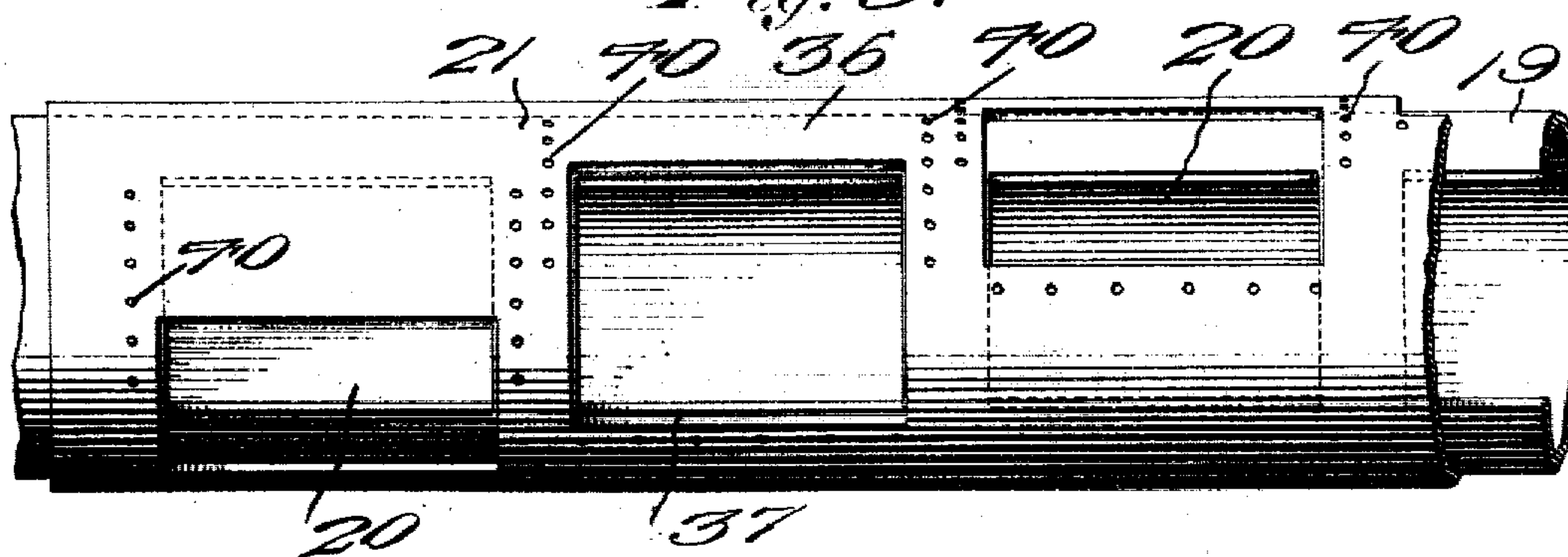
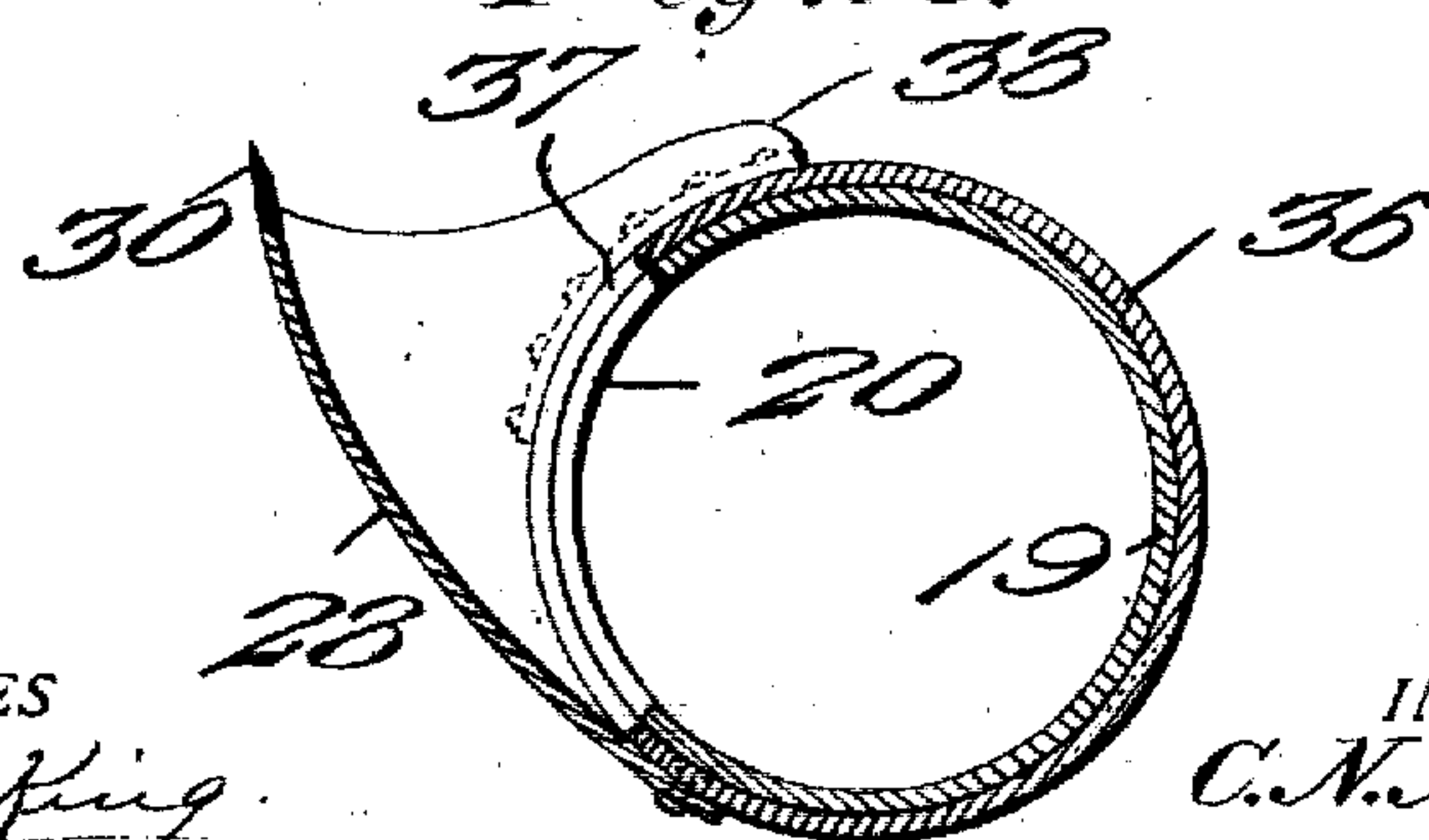


Fig. 10.



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UNITED STATES PATENT OFFICE.

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SUCTION-DREDGE.

No. 822,863.

Specification of Letters Patent.

Patented June 5, 1906.

Application filed November 28, 1905. Serial No. 289,497.

To all whom it may concern:

Be it known that I, CHARLES N. NEWCOMB, a citizen of the United States of America, residing at West Palmbeach, in the county of Dade and State of Florida, have invented new and useful Improvements in Suction-Dredges, of which the following is a specification.

This invention relates to improvements in suction-dredges of that class provided with a hollow rotary dredging-wheel carrying buckets or scoops to gather the sand, silt, gravel, clay, muck, or other material to be excavated and which material is drawn from the wheel by the suction mechanism.

The main object of the invention is to provide a novel construction of wheel and buckets or scoops for dredges of this character whereby a stronger and more durable construction is produced and an increased efficiency of operation obtained.

With the above and other objects in view the invention consists of the novel construction, combination, and arrangements of parts hereinafter fully described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a top plan view, partly in horizontal section, of a portion of the hull of a dredger embodying my improved excavating mechanism, showing in dotted lines certain features omitted by the plane of section. Fig. 2 is a vertical longitudinal section on line 2 2 of Fig. 1. Fig. 3 is a view in elevation of a portion of the hollow axle or stationary member of the excavating-wheel. Fig. 4 is a longitudinal section through a portion of the complete wheel, taken on line 4 4 of Fig. 5. Fig. 5 is a cross-section on the line 5 5 of Fig. 4. Fig. 6 is a plan view of a portion of the wheel, disclosing a modification in the construction of the hollow shaft and buckets. Fig. 7 is a perspective view of one of the buckets employed therein. Fig. 8 is a perspective view of a portion of the wheel, showing a further modification in the construction of the hollow shaft and buckets. Fig. 9 is a plan view of the same with all the buckets removed. Fig. 10 is a cross-section through the bucketed part of the wheel shown in Fig. 8. Fig. 11 is a detail section showing the construction of a cutting edge for a cast bucket.

Referring now more particularly to the

drawings, the numeral 1 designates the hull of a dredge of the described type on which is supported an engine 2, which drives the engine or power shaft 3, the fly-wheel 4 of which has a crank connection with a pitman-rod 5, which actuates the piston of a suction-pump 6, having an outlet or discharge pipe 7. The pump 6 is in communication with a suction-pipe connected with the excavating-wheel, said pipe consisting of a stationary section 8, provided or connected at its forward end with a suction-chamber 9, and a movable section 10, pivotally mounted on a counter-shaft 11, journaled in suitable bearings on the hull and extending through said suction-chamber, whereby the pipe-section 10, which projects beyond one end of the hull may swing freely in a vertical plane with the excavating-wheel. The shaft 11, which serves as a drive-shaft for the excavating-wheel, receives motion from the engine-shaft 3 through the medium of a sprocket-chain 12, engaging sprocket-wheels 13 and 14 on said shafts.

Pivotally mounted upon the ends of the shaft 11 are supporting beams or arms 15, forming a vertically-swinging frame to support the excavating-wheel, which latter is supported upon the outer ends of said arms and is adapted to be balanced or controlled by chains 16, secured at their lower ends to the arms and passing upwardly and rearwardly over supporting pulleys or sheaves 17, carried by a suitable framework 18, the chains leading back to a suitable point to be operated in any preferred manner to control the excavating-wheel in its operations.

The excavating-wheel comprises in its construction a stationary member 19, consisting of a pipe or cylinder having its ends closed and suitably mounted in the forward ends of the arms 15 and provided at suitable intervals throughout its length with openings or ports 20, through which the material taken up by the buckets or scoops feeds thereinto. The stationary member or pipe 19 forms an axle on which the hollow shafts or rotary members 21 of the wheel are revolubly mounted and serves as a suction-box from which the air is exhausted by the action of the suction-pump 6 to effect the drawal of the excavated material therein and its discharge therefrom. The suction-pipe section 10 is connected at its forward end with the cen-

tral portion of the hollow axle 19 and is adapted to swing vertically with the wheel through its pivotal connection with the shaft 11.

The hollow shafts 21, of which two are employed, surround the hollow axle 19 on opposite sides of the suction-pipe section 10 and are each composed of a series of sleeves 22, having their adjacent end portions arranged in abutting relation and provided with circumferential flanges 23, the flanges of the several sections being rigidly united by tie-bolts or rivets 24. The meeting faces of the connecting flanges are recessed to form raceways 25 for the reception of antifriction rollers, balls, or other bearing members 26, which roll in contact with the axle 19, and thus reduce friction between the same and the shaft and adapt the latter to have free revoluble movement. Each sleeve or shaft section 22 is provided at one side with an inlet-port 27 and a bucket or scoop 28 integral therewith, each scoop comprising a curved body portion 29, having a forward cutting edge 30 and side pieces 31, disposed on opposite sides of the inlet-opening 28 and integrally connected with the flanges 23, the rear end of the body portion being integrally connected with the body of the sleeve at the rear of the port 27 in the direction of revolution of the shaft. The sleeves or sections of each hollow shaft are so arranged and connected as to position the scoops or buckets at different points around the circumference of the shaft or at different points in the path of rotation thereof, so as to, in effect, give a spiral arrangement to the buckets in order that they will act alternately throughout the series in the revolution of the shaft to take up the material to be excavated. The ports 20 in the hollow axle 19 are closed by the sleeve-sections until the ports 27 of the latter come in register therewith, thus allowing the material taken up by the buckets to pass therefrom into the hollow shaft and to discharge therefrom through the suction-pipe 10. By spirally disposing the buckets in the manner described a single bucket at a time will communicate through registering ports with the axle 19, so that all of the suction power will be exerted to extract the material therefrom, a feature of obvious advantage over prior constructions in which the material is simultaneously extracted from a plurality of buckets, inasmuch as a stronger suction action for the extraction of the material from the bucket is obtained. The hollow shafts revolve rearwardly, and the cutting edges of the buckets successively come into contact with and cut away and scoop up the material, which is drawn rearwardly through the suction-pipe and discharges through the outlet-pipe 7. Motion is communicated from the drive-shaft 11 to the hollow shafts through the medium of sprocket-chains 32,

engaging sprocket-wheels 32^a and 32^b on said shafts. 65

It will be apparent that the construction described not only provides an exceedingly strong and durable construction of excavating-wheel, but permits of the ready removal of damaged parts or sections and the substitution of new ones therefor, and also that the arrangements of the buckets and their mode of operation materially increases the efficiency of the apparatus. 70 75

In the embodiment of the invention disclosed in Figs. 6 and 7 the buckets instead of being integral with the shaft-sleeves are independent thereof and secured thereto. As shown, the lower rear end of the bucket or scoop is provided with a row of apertures 33, while the sides thereof are formed with rearwardly-extending curved arms 34, having rows of apertures 35. The sides of the body portion and arms 34 are segmentally curved to conform to the shape of the shaft-sleeve, and bolts or rivets are passed through the rows of perforations 33 and 35 to secure the bucket to the sleeve. The arms 34 preferably abut against the flanged ends of the sleeves and are fastened thereto by the bolts or rivets which secure the flanges of the adjacent sleeves together. This construction permits of the removal of the bucket proper without detaching the sleeve and the discarding of an injured bucket without the necessity of removing and discarding the sleeve to which it is attached. 80 85 90 95

In Figs. 8, 9, and 10 I have shown a further modification wherein the hollow shaft instead of being made sectional by coupling together a series of sleeves consists of a single tube 36, provided with ports or passages 37 to register in the rotation of said shaft with the ports 20 in the hollow axle 19. The ports 37, as clearly shown in Fig. 9, are arranged in a spiral row around the circumference of the shaft, each port, commencing with one of the end ports, being disposed a little farther around the shaft in the direction of rotation thereof from the one immediately preceding it, so that the buckets or scoops will have a corresponding arrangement. The buckets or scoops disclosed in this invention correspond substantially in construction with that disclosed in Figs. 6 and 7, except that the curved arms 34, instead of being provided with the apertures 35, are formed with laterally-projecting flanges 38, in which the perforations are formed for the passage of bolts or rivets 39 to fasten the same to the shaft, which latter is provided with rows of perforations 40 for the passage of said bolts or rivets and which are properly arranged relative to the respective ports to accord with the positions of the ports, so that the buckets may be properly fastened in position to register therewith. In each of the 100 105 110 115 120 125

constructions described the body portion of the hollow shaft operates as a valve to close the ports 20 in the hollow shaft 19 until the bucket-openings in the hollow shaft come into register therewith, the buckets by their spiral arrangement successively discharging in the course of rotation of the shaft into the hollow axle 19.

It is preferred in practice to form the hollow shaft and buckets of wrought-steel, in which event the cutting-surfaces 30 of the buckets may be formed by beveling the forward edges thereof in such manner as to adapt them to be conveniently sharpened when required. The buckets, however, may be made of cast metal, in which event the cutting portions thereof are formed by steel cutting-knives applied thereto. As shown in Fig. 11, which discloses one form of construction of removable cutting-knife, the bucket is formed with a beveled tip 41 and a recess 42, the latter being adapted to receive the body of the cutting-blade 43, which is secured thereto by rivets or other fastenings 44. The blade 43 terminates in a beveled cutting edge 45 and is provided in rear of the same with an undercut recess 46 to receive the beveled tip 41, thus interlocking the parts securely together and disposing the faces of the blade flush with the surfaces of the bucket. This construction provides a cutting edge which possesses durability and which may be sharpened when occasion requires and which also permits of the removal of a cutting-blade which is worn out and the ready substitution of a new one therefor.

From the foregoing description, taken in connection with the accompanying drawings, the construction and mode of operation of the invention will be readily understood, and it will be seen that it provides a bucket-wheel for dredges of the character described which is simple of construction and embodies substantial advantages, among them strength and durability and increased efficiency of operation, the latter being due to the disposition of the buckets in such manner as to successively discharge their loads and to secure a maximum suction action on each load at a time to insure the discharge of the entire amount of material taken up by each shovel into the hollow axle or suction-box 19.

It will of course be understood that a continuous rotary shaft instead of a pair of shafts may be revolvably mounted upon the hollow axle and the arrangement of the suction-pipe varied accordingly.

Having thus described the invention, what is claimed as new is--

60 1. In an excavator, an excavating-wheel provided with a suction-box, and a spirally-arranged series of rotary buckets adapted to communicate at prescribed points in their period of revolution therewith.

2. In an excavator, an excavating-wheel 65 provided with a suction-box having ports therein, and a series of spirally-arranged buckets revoluble thereon, said buckets being adapted to register with said ports at prescribed points in their path of revolution. 70

3. In an excavator, an excavating-wheel comprising a hollow axle forming a suction-box and provided with ports, a hollow shaft revoluble on said axle and provided with ports to register with the aforementioned 75 ports, the said ports in the shaft being disposed spirally around the shaft, and buckets carried by the hollow shafts and communicating with said ports.

4. In an excavator, an excavating-wheel 80 comprising a hollow axle forming a suction-box and provided with ports, a hollow shaft revoluble on said axle and provided with cooperating ports, and buckets carried by said shafts and communicating with the ports 85 therein.

5. In an excavator, an excavating-wheel comprising a hollow axle forming a suction-box and provided with ports, said ports being arranged in a series at different points in the circumference thereof, a hollow shaft revoluble on said axle and provided with correspondingly-arranged ports, and buckets carried by the axle and communicating with the ports therein. 95

6. In an excavating apparatus, an excavating-wheel comprising a hollow axle provided with ports, a hollow shaft revoluble thereon and provided with cooperating ports, and buckets removably secured to said hollow 100 shaft and communicating with the ports therein.

7. In an excavating apparatus, an excavating-wheel comprising a hollow axle provided with ports, a hollow shaft revoluble thereon, said shaft comprising a series of connected sleeves and provided with cooperating ports, and buckets carried by said sleeves communicating with the ports therein. 105

8. In an excavator, an excavating-wheel 110 comprising a hollow axle having ports, a hollow shaft revoluble thereon and comprising a series of flanged sleeves provided with cooperating ports, fastening means engaging said flanges and holding the sleeves assembled, 115 and buckets carried by the sleeves and communicating with the ports therein.

9. In an excavator, an excavating-wheel comprising a hollow axle provided with ports, a hollow shaft revoluble thereon and 120 comprising a series of sections having coupling-flanges, said flanges being recessed to form raceways, fastenings coupling said flanges, antifriction-bearings arranged in said raceways, and buckets carried by the sleeves 125 communicating with the ports therein.

10. In an excavator, an excavating-wheel comprising a hollow axle provided with a se-

ries of ports spirally arranged around the circumference thereof, a hollow shaft revoluble on said axle and provided with correspondingly-arranged ports, and buckets removably
5 mounted upon the shaft and communicating with the ports therein, the unported portions of the shaft forming valves to control the ports in the axle.

11. In an excavating apparatus, an excavating-wheel comprising a hollow axle provided with ports, a hollow shaft revoluble
10 thereon and provided with cooperating ports,

and buckets carried by the shaft and communicating with the ports therein, said buckets being secured at their rear edges to the shaft
15 and provided with curved arms fastened thereto.

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

CHARLES N. NEWCOMB.

Witnesses:

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S. W. BURKHARDT.