No. 626,491. Patented June 6, 1899.

J. T. FORD.

DREDGE FOR HARD OR SOFT MUD.

(Application filed Dec. 31, 1897.)

(No Model.) 6 Sheets—Sheet 1.

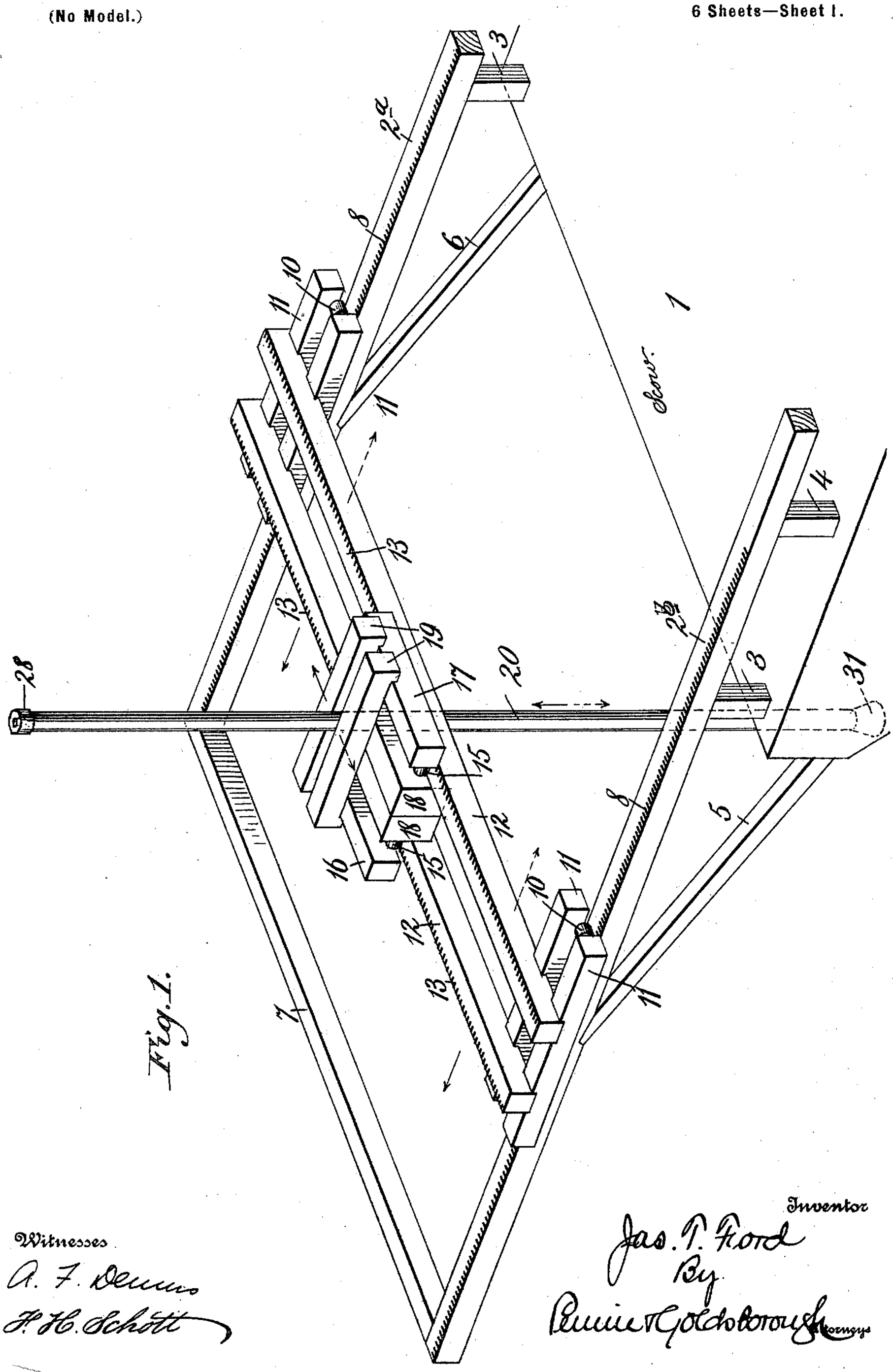

Fig. 1.

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(No Model.) 6 Sheets—Sheet 2.

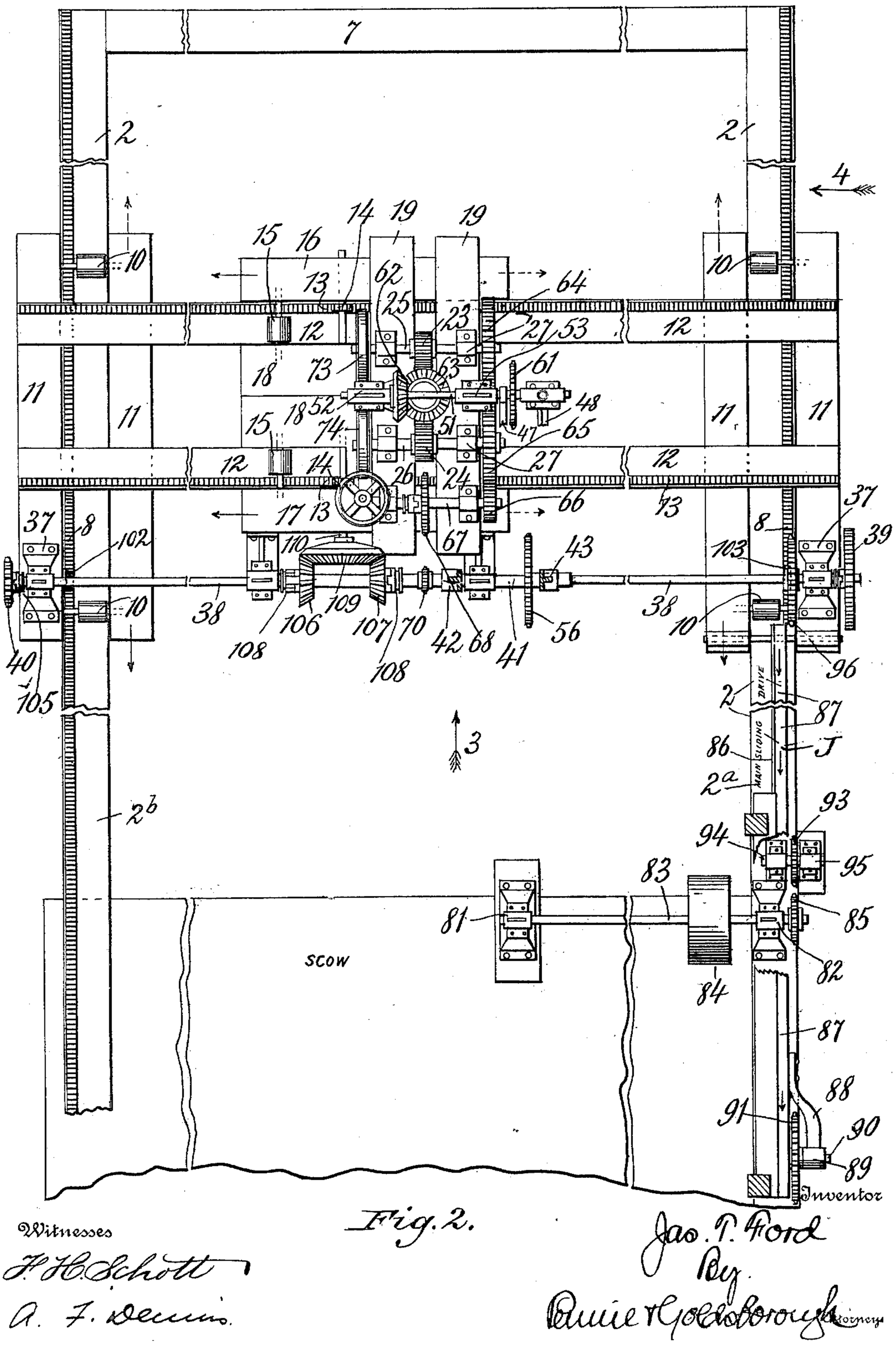

Fig. 2.

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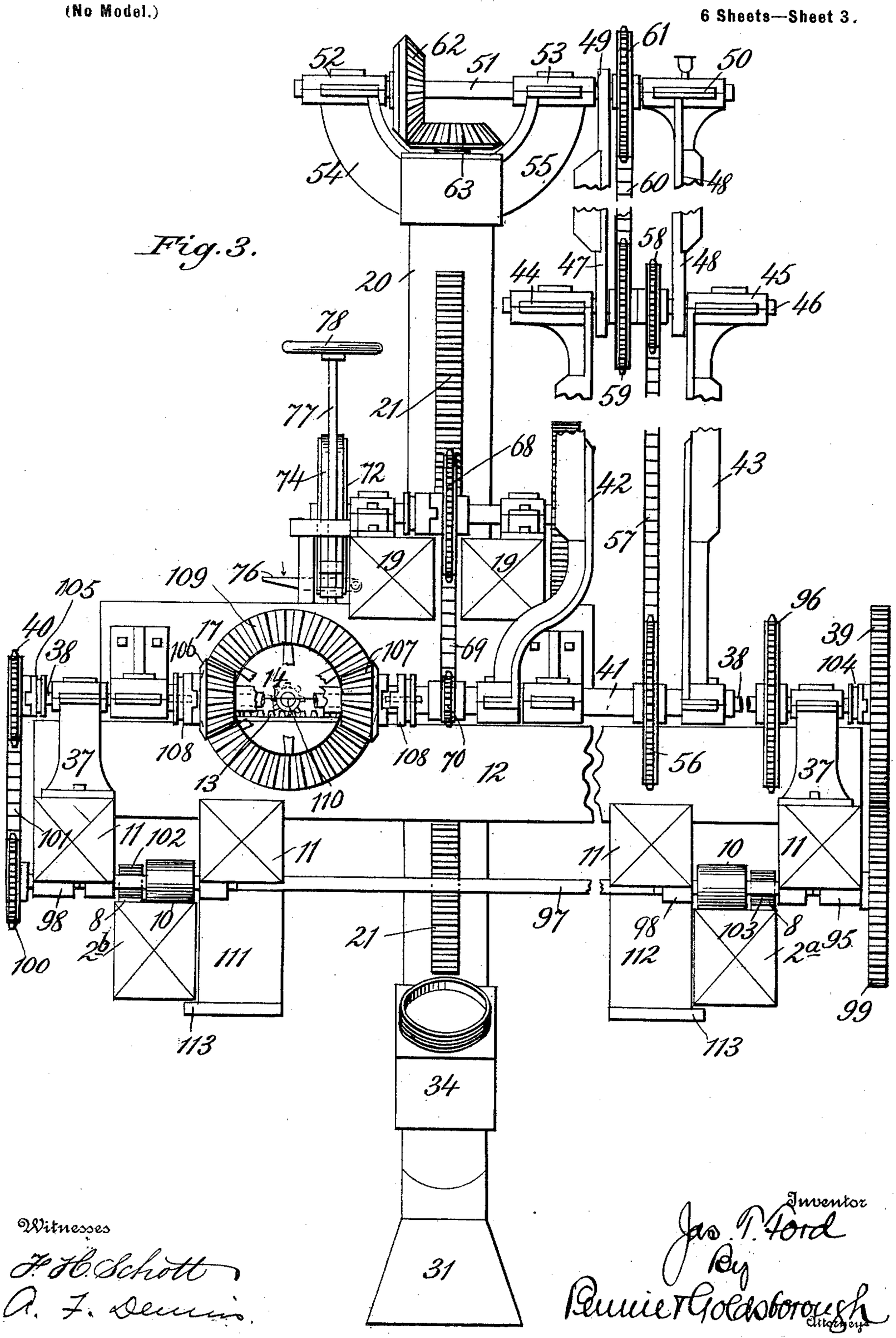
(No Model.) 6 Sheets—Sheet 3.

Fig. 3.



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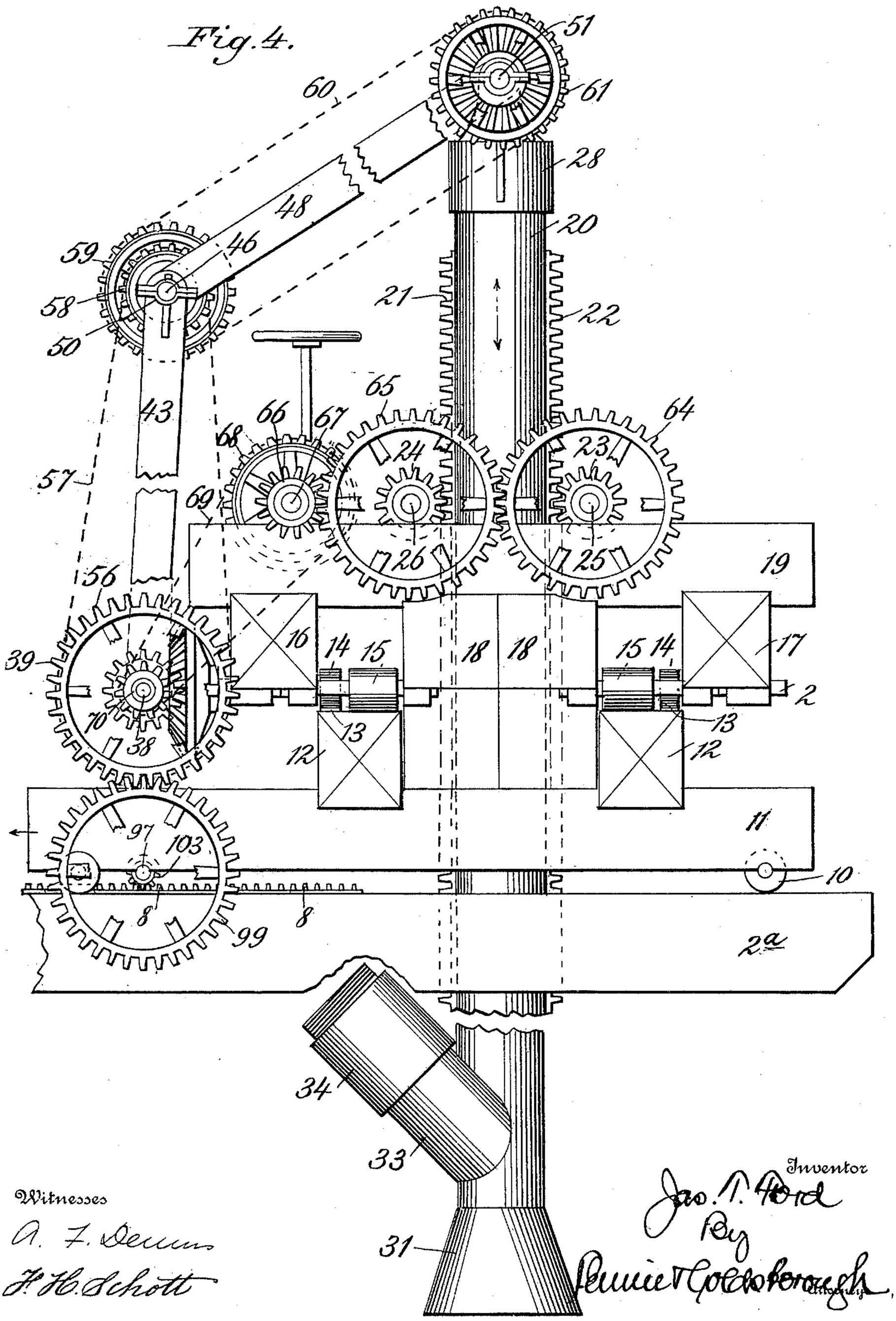
(No Model.) 6 Sheets—Sheet 4.

Fig. 4.



Witnesses

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(No Model.) 6 Sheets—Sheet 5.

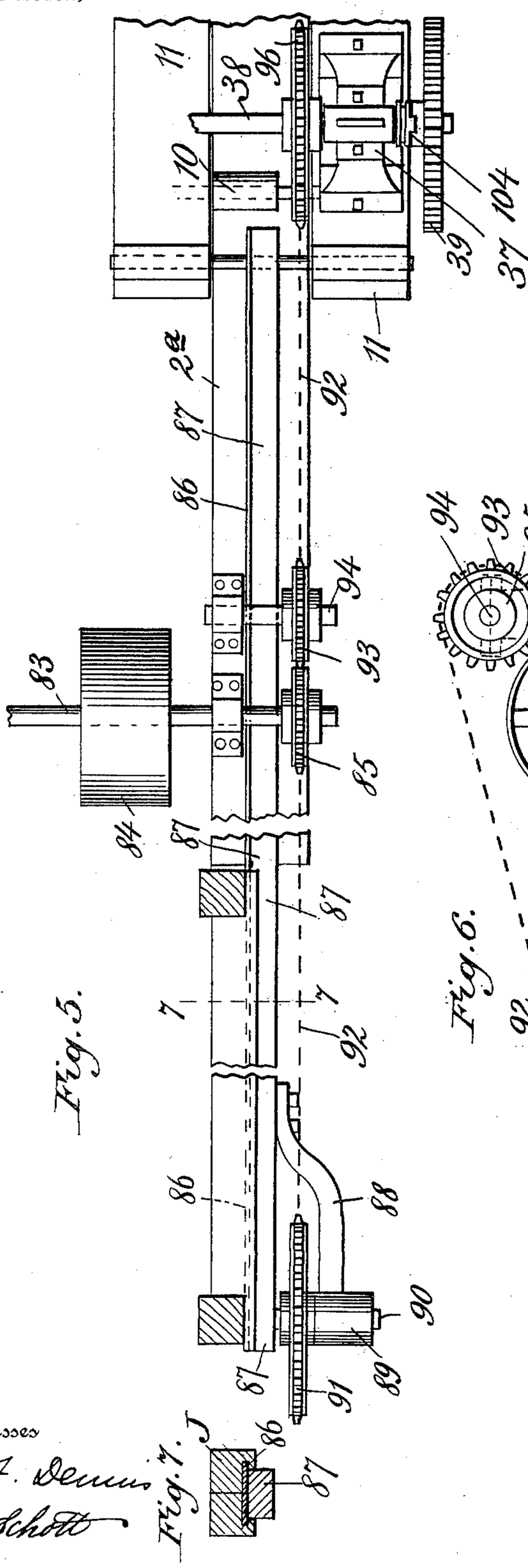

Fig. 5.

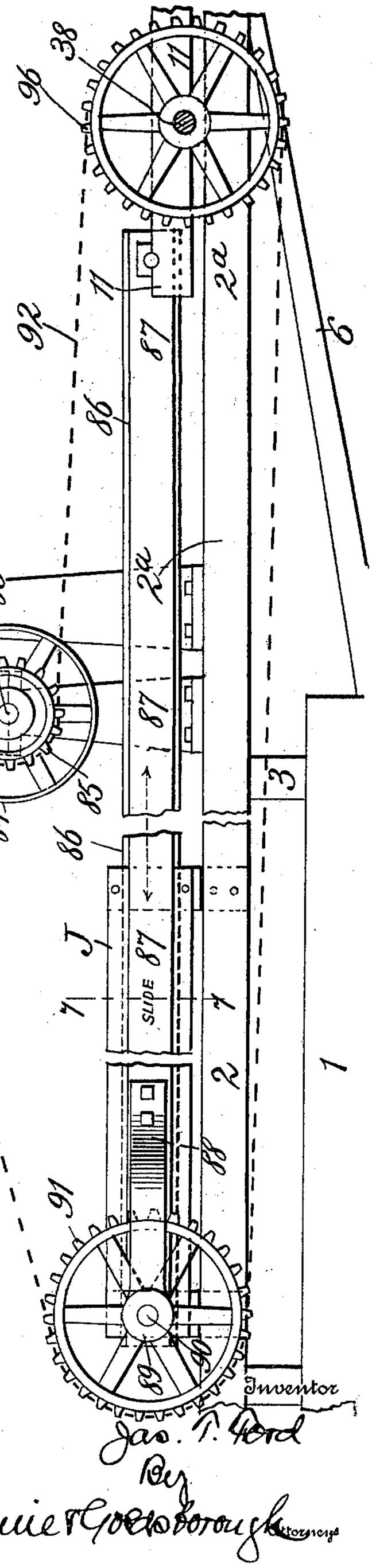

Fig. 6.

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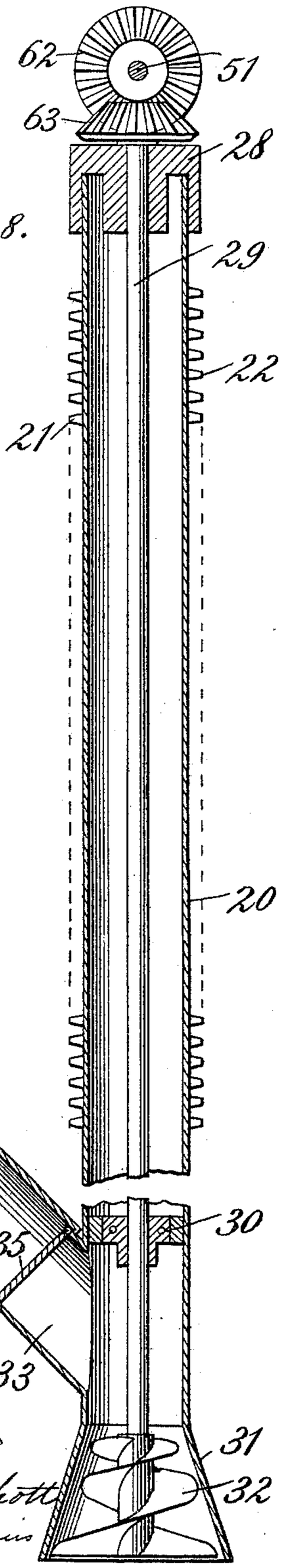
(Application filed Dec. 31, 1897.)

(No Model.) 6 Sheets—Sheet 6.

Fig. 8.



Witnesses
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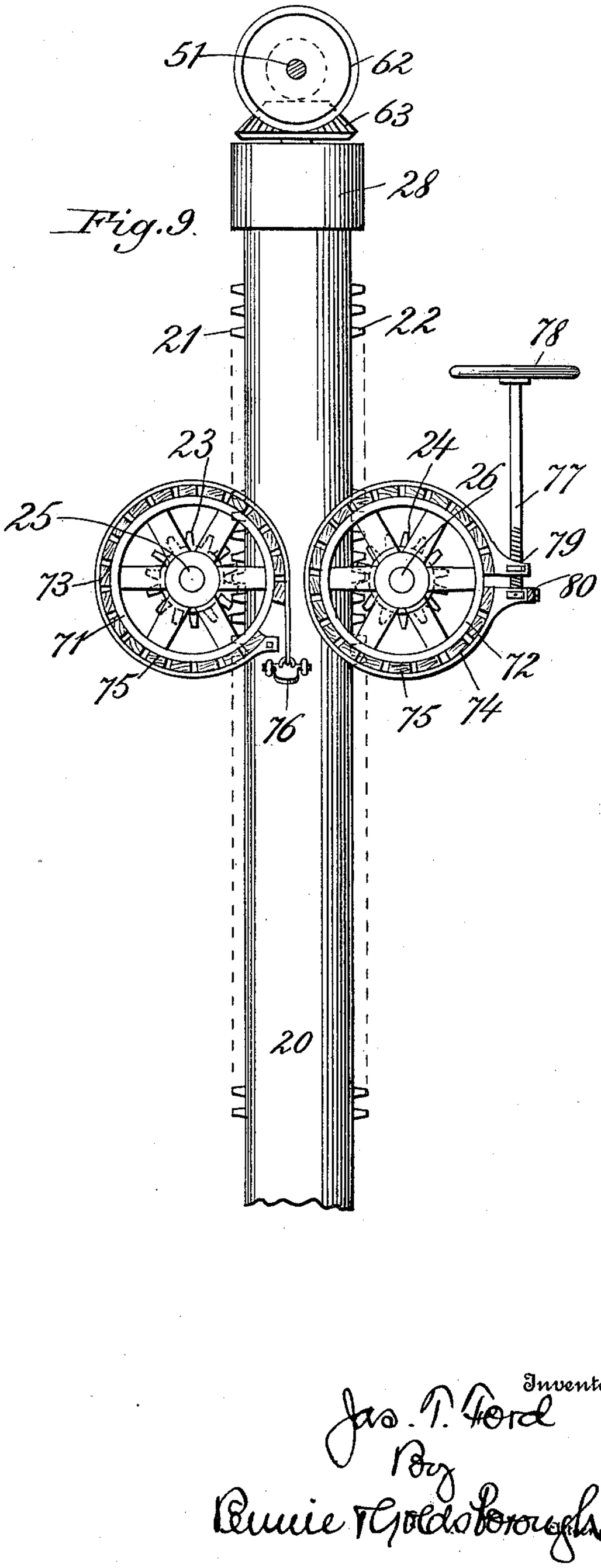
A. F. Dennis

Fig. 9.



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UNITED STATES PATENT OFFICE.

JAMES THOMAS FORD, OF GALVESTON, TEXAS.

DREDGE FOR HARD OR SOFT MUD.

SPECIFICATION forming part of Letters Patent No. 626,491, dated June 6, 1899.

Application filed December 31, 1897. Serial No. 664,837. (No model.)

To all whom it may concern:

Be it known that I, JAMES THOMAS FORD, a citizen of the United States, residing at Galveston, in the county of Galveston and State of Texas, have invented certain new and useful Improvements in Dredges for Hard or Soft Mud; 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.

My invention relates to dredging-machines, the object being to provide improved mechanism for readily moving the excavator of the machine to different working positions with relation to the scow or vessel from which it is supported and for adjusting the excavating apparatus vertically and retarding its downward movement.

The characteristic features of the invention will be fully described hereinafter and are embodied in the construction illustrated in the accompanying drawings, in which similar reference-numerals indicate corresponding parts throughout the several views.

Figure 1 is a view in perspective of the supporting-timbers or trackways of the machine secured to a dredging-scow. Fig. 2 is a plan view, partly in section, of the machine with its supporting-timbers or trackways broken away for convenience of illustration. Fig. 3 is an elevation of the machine looking in the direction of the arrow 3, Fig. 2. Fig. 4 is a side elevation in the direction of the arrow 4, Fig. 2. Figs. 5 and 6 are respectively an enlarged plan, partly in section, and an enlarged side elevation of parts of the mechanism shown in Fig. 2. Fig. 7 is a section on the line $x\ x$ of Figs. 5 and 6. Fig. 8 is a vertical sectional view of the excavator, its tubular casing, and discharge-pipe; and Fig. 9 is an elevation of a portion of the tubular casing of the excavator provided with brake mechanism for retarding the downward movement thereof.

Referring particularly to Figs. 1 and 2, the reference-numeral 1 designates a scow upon which the dredging mechanism is supported.

2^a and 2^b indicate parallel timbers or bars supported at their inner ends upon the scow by standards 3 and 4 and inclined braces 5 and 6 and connected together at their outer ends by a cross-bar 7. The upper surface of each of these bars 2^a and 2^b is provided near one edge with rack-teeth 8, adapted to be engaged by pinions 102 103, mounted on a shaft on the lower carriage of the apparatus. The timbers 2^a and 2^b serve also as tracks for rollers 10, suitably mounted on the lower carriage. This lower carriage comprises two pairs of parallel bars 11, connected by a pair of parallel transverse bars 12, the upper surfaces of which are provided with rack-teeth 13 to be engaged by pinions 14 on the driven shaft of the upper carriage. The upper carriage comprises parallel transverse bars 16 and 17, two central blocks or bars 18, and parallel connecting-bars 19, arranged at right angles to the bars 16, 17, and 18 and connecting the latter together. Rollers 15 are mounted on short shafts between the bars 16 and 17 and the central bars 18, on either side of the latter, to permit the upper carriage to travel on the bars 12.

The parallel connecting-bars 19 are arranged some distance apart, so as to admit of the passage between them of the vertically-disposed excavator pipe or casing 20, and the said bars constitute lateral supports for said casing, which prevent the latter from swaying to one side or the other in the directions of movement of the upper carriage. In this way there is less tendency of the operating devices for the casing to bind, and the movements of both the said casing and its contained auger are derived with greater ease and effectiveness. The devices for moving the casing vertically are arranged to engage the casing, at the sides thereof, parallel to the path of movement of the upper carriage, and said devices (hereinafter referred to) also prevent any swaying of the casing in the directions of movement of the lower carriage.

From the description thus far it will be seen that the bars 2^a and 2^b serve as a trackway upon which the lower carriage (carrying the upper carriage) travels and that the transverse bars 12 of the lower carriage constitute trackways upon which the upper carriage may be moved. These movements of the carriages (effected by mechanism hereinafter described) serve to move the excavator to any position within the rectangle described by the bars 2^a and 2^b and 7 and the adjacent

end of the scow, the excavator pipe or casing 20 being supported to move with the upper carriage, as will be described.

The casing 20 of the excavator is provided on its outer surface at diametrically-opposed points with vertical racks 21 and 22, adapted to be engaged by gear-pinions 23 and 24, mounted on parallel shafts 25 and 26, supported in bearings 27 on the parallel bars 19 of the upper carriage, the revolution of the shafts 25 and 26 by the gearing hereinafter described serving to raise and lower the tubular casing 20.

The casing 20 is provided at its upper end with a cap 28, centrally bored to serve as the upper bearing for the excavator-shaft 29. Near its lower end the casing 20 is provided with an internal bearing 30, which supports the lower portion of the shaft 29. The lower end 31 of the casing is flared to accommodate a spiral blade or auger 32, mounted upon the lower end of the shaft 29 and serving to loosen the mud and convey it upwardly to a suction-pipe 33, entering the tubular casing 20, at a point just above the flared end of the latter, at an angle thereto. This suction-pipe 33 is provided with a circumferential enlargement 34, serving as a valve-chamber and containing a valve 35, hinged at one side of the valve-chamber and seating on the shoulder 36 of said chamber. The pipe 33 is screw-threaded externally at its upper end for the attachment of a hose or discharge-pipe (not shown) adapted to be connected to a suitable pump for removing the loosened mud delivered by the auger 32.

Upon the outer parallel bars 11 of the lower carriage are secured bracket-bearings 37, which support the main driving-shaft 38 of the machine, having mounted upon one end the driving gear-wheel 39 and at its opposite end a sprocket-wheel 40. Upon the shaft 38 is keyed a longitudinally-movable sleeve 41, upon which are pivotally supported the lower ends of a yoke, comprising the members 42 and 43, the upper ends of which are provided with bearings 44 and 45 for a shaft 46, upon which are pivotally supported the lower ends of parallel arms 47 and 48. The upper ends of these arms 47 and 48 are provided with bearings 49 and 50 for a shaft 51, which extends beyond the arm 47 and over the upper end of the tubular casing 20 of the excavator-shaft. The shaft 51 is further supported by bearings 52 and 53, formed at the upper ends of upwardly-extending arms 54 and 55, projecting from the cap 28 of the casing 20.

Upon the sleeve 41 is secured a sprocket-wheel 56, connected by a chain 57 with a sprocket-wheel 58 on the shaft 46. A second sprocket-wheel 59 is mounted on the shaft 46 concentric with the wheel 58, and this wheel 59 is connected by a sprocket-chain 60 with a sprocket-wheel 61 on the shaft 51. A vertically-arranged bevel gear-wheel 62 on the shaft 51 meshes with a coacting bevel gear-wheel 63, mounted on the upper end of the excavating-shaft 29. Thus rotary motion is imparted to the shaft 29 from the shaft 38 through the gearing specified and clearly shown in Fig. 3.

The tubular casing 20 and its contained mechanism are raised and lowered by the gear-pinions 23 and 24 on the shafts 25 and 26 through the intermeshing gears 64 and 65, mounted, respectively, on the shafts 25 and 26 and driven by a pinion 66 on the end of a shaft 67, supported in bearings on the bars 19 of the upper carriage parallel to the shafts 25 and 26, said shaft 67 being driven from the shaft 38 by sprocket-gearing 68, 69, and 70.

The upward-and-downward movement of the tube or casing 20 necessarily varies the position of the shaft 51, since the latter is secured to the upper end of the casing. To compensate for the movement of the shaft 51 and its sprocket-wheel 61, the arms 47 and 48 are, as above described, pivotally secured to the upper ends of the yoke members 42 and 43, and the latter are loosely mounted on the sleeve 41. This construction permits the supporting-yoke and the arms 47 and 48 to accommodate themselves to variations in the height of the excavating-tube and the latter to be freely moved vertically without affecting the operation of the gearing which revolves the excavator-shaft.

For lowering the excavator-tube 20 it is important to provide brake mechanism. Upon the ends of the shafts 25 and 26 opposite to those which carry the wheels 64 and 65 are mounted brake-wheels 71 and 72. Around each of these wheels is arranged a friction strap or band 73 and 74, lined with blocks 75 of wood or other material for forming a good friction-surface. The brake-band 73 is secured at one end and after passing around the wheel 71 is secured to a treadle or foot lever 76, secured to the frame of the upper carriage. The ends of the brake-band 74 are connected by a screw-threaded rod 77, provided with a hand-wheel 78, which passes through an internally-threaded opening 79 in one end of the band and into a nut 80, secured to the other end of the band. It will be apparent that by means of these brake-bands the revolution of the shafts 25 and 26 can be controlled to lower the excavating-tube gradually and without shock or jar.

I will now describe the mechanism for moving the lower carriage upon the trackways 2^a and 2^b.

Upon the scow 1 is supported in suitable bearings 81 and 82 a shaft 83, having mounted thereon a belt-pulley 84, adapted to be driven from a suitable source of power carried on the scow, and a sprocket-wheel 85.

The rear end of the timber 2^a is formed with a supplemental portion J, provided on its outer side with a dovetail longitudinal recess 86, Fig. 5, within which is supported a sliding bar or rail 87 of dovetail form in cross-section and provided at its outer end with a bracket-arm 88, formed with a bearing 89 to

support a short shaft 90, having a sprocket-wheel 91 mounted thereon. A sprocket-chain 92 passes around the wheel 91, thence around an idler sprocket-wheel 93, mounted upon a short shaft 94, supported in bearings 95 above the plane of, but parallel to, the shaft 83, thence around the wheel 85 on the shaft 83, and thence around a sprocket-wheel 96 on the shaft 38. Below the shaft 38, but in the same vertical plane therewith, is a shaft 97, supported in bearings 98 on the under sides of the timbers 11. Upon this shaft 97 at one end is a gear-wheel 99, adapted to mesh with the driving gear-wheel 39, and at the opposite end a sprocket-wheel 100, connected by a sprocket-chain 101 with the sprocket-wheel 40 on the end of the shaft 38. Upon the shaft 97 are also mounted the gear-pinions 102 and 103, engaging the racks 8 on the timbers 2. The shaft 38 is driven from the shaft 83 through the sprocket-gearing 85, 91, 92, 93, and 96. A clutch 104 is employed to throw the gear-wheel 39 into and out of engagement with the wheel 99, and when said wheels 39 and 99 are in gear the lower carriage will be moved in one direction through the rack-and-pinion gearing 102, 103, and 8, the bar or rail 87 sliding in its groove to move the wheel 91. To reverse the movement of the lower carriage, the sprocket-wheel 40 is thrown into gear with the shaft 38 by a clutch 105, and the wheels 39 and 99 are thrown out of gear.

The upper carriage is moved upon its trackways 12 by mechanism which will now be described.

Upon the sleeve 41 on the shaft 38 are arranged two oppositely-disposed bevel gear-pinions 106 and 107, each provided with a clutch device 108 and adapted to be thrown into and out of gear with a bevel gear-wheel 109, mounted upon the end of a shaft 110, supported in bearings on the bars 16 and 17 of the upper carriage and carrying the gear-pinions 14, meshing with the racks 13 of the trackways 12. It will be apparent that the upper carriage will travel in one or the other direction accordingly as the gear-pinion 106 or 107 is in mesh with the bevel gear-wheel 109, the carriage being provided with the rollers 15, running on the trackways 12.

The lower carriage is provided on the under side of the timbers 11 with longitudinal bars 111 and 112, having flanges 113 to serve as guards or guides for the carriage in its movement.

From the foregoing description it will be seen that the excavating mechanism (comprising the shaft 29, auger 32, tubular casing 20, and the gearing for revolving the shaft 29) is readily raised and lowered independently of the movement of the upper and lower carriages and that the carriages may be moved to bring the excavating device into any position within the area defined by the trackways 2^m, the cross-bar 7, and the adjacent end of the scow.

Having thus described the invention, what I claim is—

1. In a dredging-machine, the combination with a support having an overhanging frame, of a main carriage movable on said frame toward and away from the support, a supplemental carriage movable back and forth on the main carriage at an angle to the path of movement of the latter, a vertically-movable suction-pipe, transverse parallel bars on the supplemental carriage for supporting the suction-pipe laterally, and a brake device supported by the bars for controlling the descent of the suction-pipe.

2. In a dredging-machine, the combination with a support having an overhanging frame, of a main carriage movable on said frame toward and away from the support, a supplemental carriage movable back and forth on the main carriage at an angle to the path of movement of the latter, a vertically-movable suction-pipe, transverse parallel bars on the supplemental carriage for supporting the suction-pipe laterally, operating devices for the pipe supported by the bars, and a brake device for said pipe also supported by said bars.

3. In a dredging-machine, the combination of a stationary support, the drive-wheel 85 located thereon, a movable carriage for supporting the working parts, the shaft 38 mounted on the carriage and carrying the wheel 96, the idler arranged in fixed relation to the drive-wheel, the movable gear 91, and drive-chain 92, the shaft 97 supported by the carriage, and shiftable connection between said shafts for reversing the movements of said carriage.

4. In a dredging-machine, the combination of a stationary support, the drive-wheel 85 located thereon, a movable main carriage for supporting the working parts, the shaft 38 mounted on this carriage and carrying the wheel 96, the idler 93, the movable gear 91, and drive-chain 92, a supplemental carriage movable upon said main carriage at right angles thereto, the shaft 97 supported by the main carriage, shiftable connections between said shafts for reversing the movements of the main carriage, and means on said shaft 38 for reversing the movements of said supplemental carriage.

5. In a dredging-machine, the combination with a support having an overhanging frame, of a main carriage movable on said frame toward and away from the support, a supplemental carriage on the main carriage, means for moving the same back and forth at an angle to the path of movement of said main carriage, a vertically-adjustable suction-pipe, and a brake device for controlling the descent of the pipe.

6. In a dredging-machine, the combination with a support having an overhanging frame, of a main carriage movable on said frame toward and away from the support, a supplemental carriage on the main carriage, means for moving the same back and forth at an angle to the path of movement of said main car-

riage, a vertically-adjustable suction-pipe, oppositely-disposed racks and pinions for operating the same, a hand-brake operating on the shaft of one of said pinions, and a foot-brake operating upon the shaft of the other.

7. In a dredging-machine, the combination of a vertically-adjustable suction-pipe, a gear-rack on the same, a pinion meshing with said rack, and a brake on the shaft of the pinion to control the descent of the pipe.

8. In a dredging-machine, the combination of a vertically-adjustable suction-pipe, oppositely-disposed gear-racks on said pipe, pinions meshing with said racks, the shafts of said pinions being intergeared, a hand-brake operating on the shaft of one pinion, and a foot-brake adapted to operate on the shaft of the other.

9. In a dredging-machine, the combination of a fixed frame, a movable carriage thereon, a gear-rack on the frame, a gear on the carriage intermeshing with said rack, a supplemental carriage movable on the first-mentioned carriage, a gear on the supplemental carriage meshing with a rack on the main carriage, a driving-gear located in fixed position relative to the frame, and compensating gearing interposed between the gear on the main carriage and that on the frame.

10. In a dredging-machine, the combination of a stationary support, the drive-wheel 85 located thereon, a movable carriage for supporting the working parts, the wheel 96 on the shaft 38 mounted on the carriage, the idler 93 located in fixed relation to the wheel 85, the movable gear 91, and the drive-chain 92 passing around said gears.

11. In a dredging-machine, the combination of a stationary frame, a movable carriage for supporting the working parts, a gear-rack on one of the timbers of the frame, a shaft 97 on the carriage having a gear intermeshing with said rack, a supplemental carriage adjustable on the main carriage, a gear-rack on one of the timbers of the main carriage, a shaft mounted on the supplemental carriage and carrying a pinion meshing with said rack, a gear on the said shaft, an operating-shaft 38 on the main carriage, sliding pinions on the shaft 38 either of which is adapted to drive the gear on the supplemental carriage-shaft, and a gear connection between shafts 38 and 97.

12. In a dredging-machine, the combination with a fixed frame, of a carriage movable or adjustable thereon in one direction, a supplemental carriage movable or adjustable in a direction at an angle to the carriage first named, a vertically-adjustable suction-pipe supported to move with the carriage, a revolving blade or auger located in said pipe, and a compensating mechanism between the upper end of the pipe and the driving device for the auger, the same comprising a driven shaft having thereon a longitudinally-movable sleeve, a yoke pivotally supported on the sleeve, pivoted arms supported on a shaft held by the yoke, a shaft held by the arms for driving the auger, and driving connections between said driven shaft and the second-mentioned shaft and between the latter and the third-mentioned shaft.

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

JAMES THOMAS FORD.

Witnesses:
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A. S. YEAGLEY.