

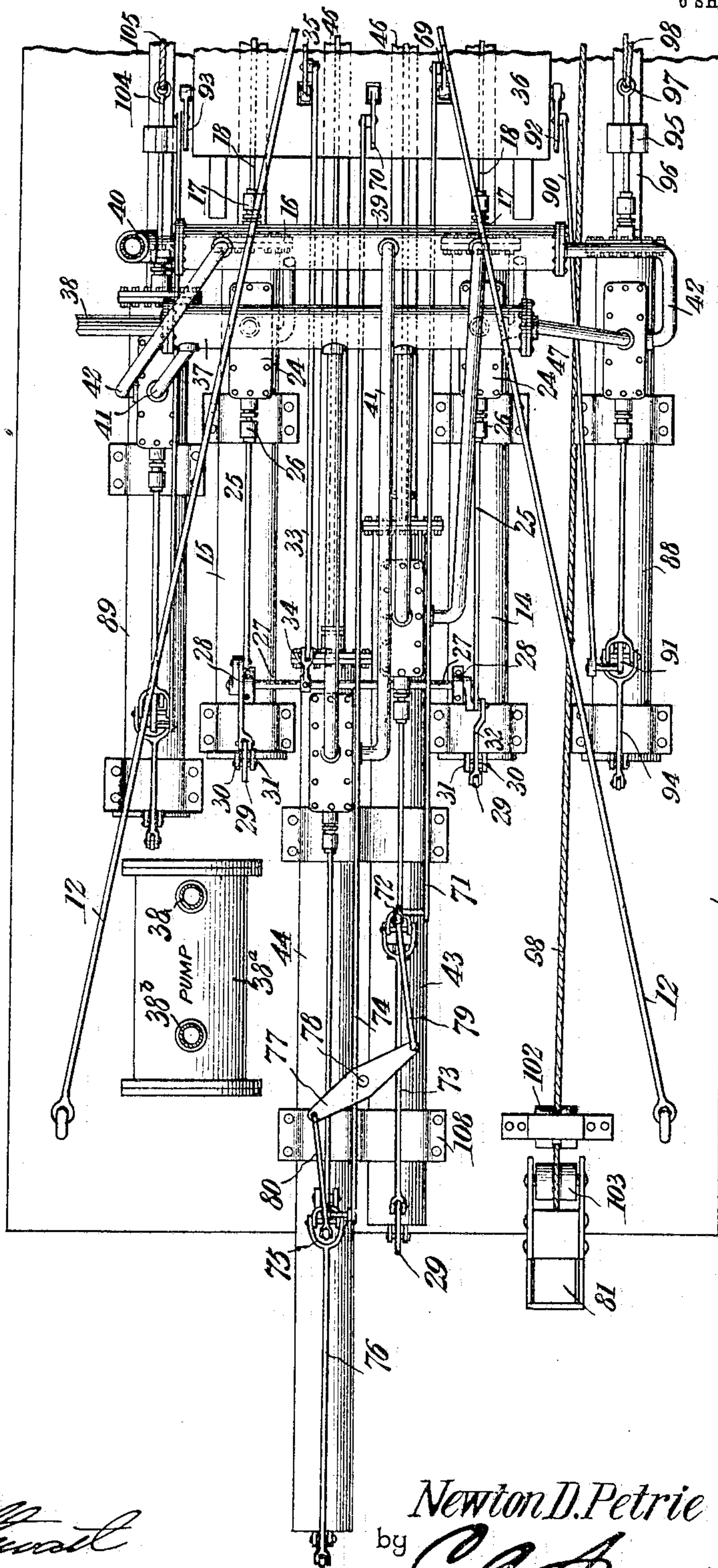
No. 781,738.

PATENTED FEB. 7, 1905.

N. D. PETRIE.
EXCAVATING MACHINE.
APPLICATION FILED APR. 2, 1904.

6 SHEETS—SHEET 1.

Fig. 1.



Witnesses:
E. F. Howard
R. M. Elliott

Newton D. Petrie Inventor,
by *Chas. Snow & Co*
Attorneys.

No. 781,738.

PATENTED FEB. 7, 1905.

N. D. PETRIE.
EXCAVATING MACHINE.
APPLICATION FILED APR. 2, 1904.

6 SHEETS—SHEET 2.

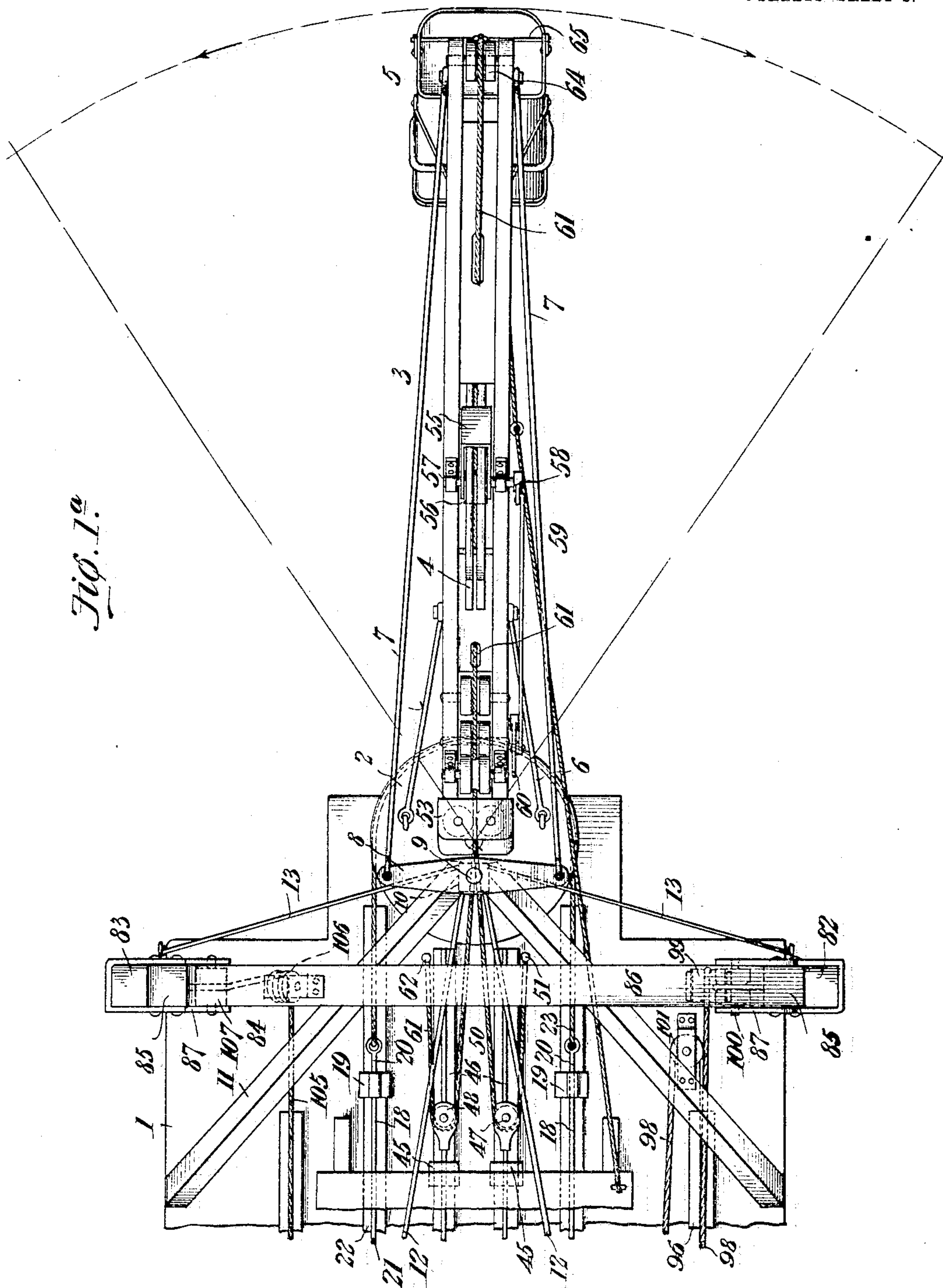


Fig. 1^a

Witnesses:

Witnesses
E. J. Stewart
R. M. Elliott.

Newton D. Petrie Inventor,
by *C. A. Snow & Co.*
Attorneys.

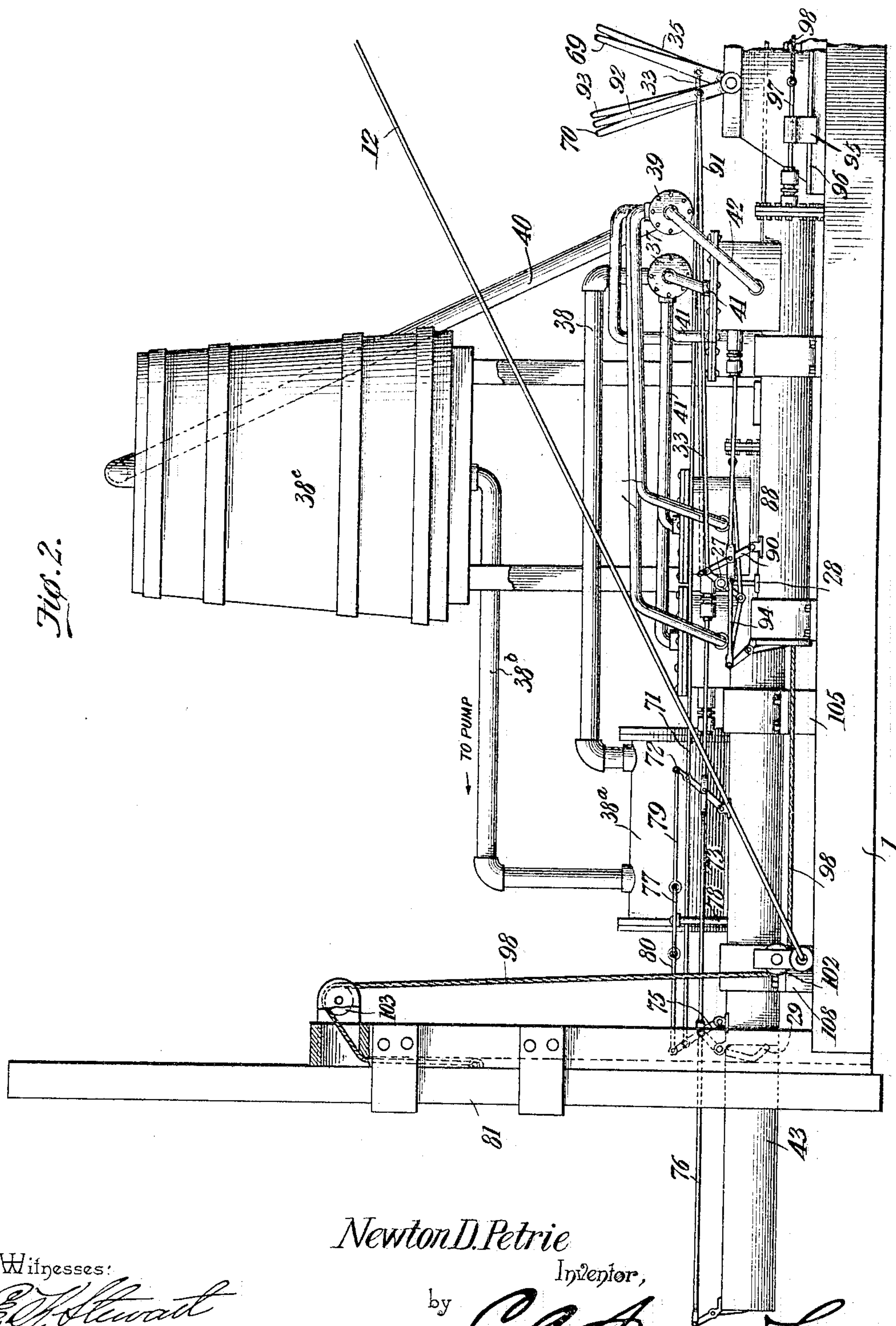
Attorneys.

No. 781,738.

PATENTED FEB. 7, 1905.

N. D. PETRIE.
EXCAVATING MACHINE.
APPLICATION FILED APR. 2, 1904.

6 SHEETS—SHEET 3.



Newton D. Petrie

Inventor,

by

C. A. Snow & Co.

Attorneys.

Witnesses:
E. J. Stewart
R. M. Elliott.

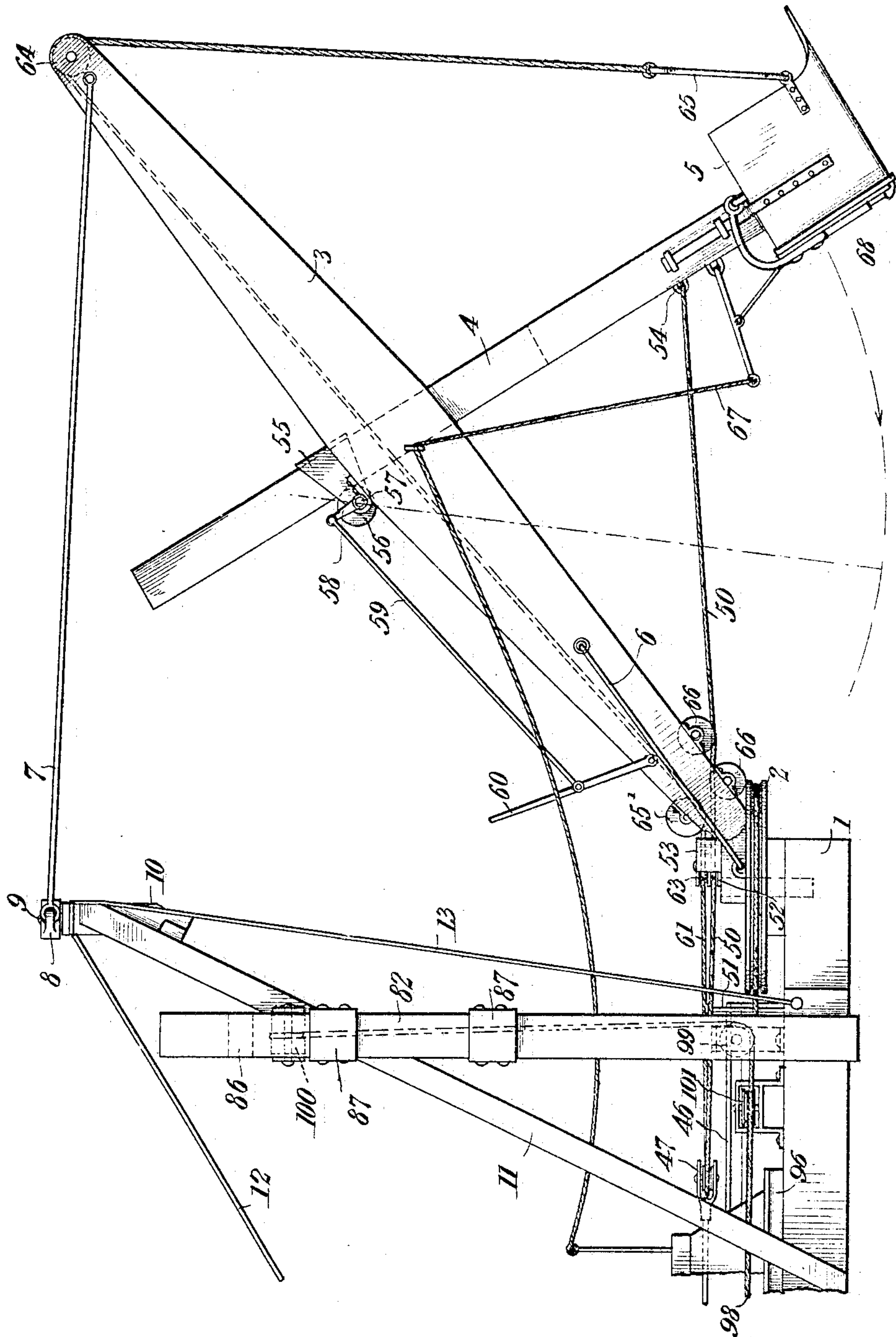
No. 781,738.

PATENTED FEB. 7, 1905.

N. D. PETRIE.
EXCAVATING MACHINE.
APPLICATION FILED APR. 2, 1904.

6 SHEETS—SHEET 4.

Fig. 2.



Witnesses:

E. J. Stewart
R. M. Elliott

Newton D. Petrie Inventor,

by

C. A. Snow & Co.
Attorneys.

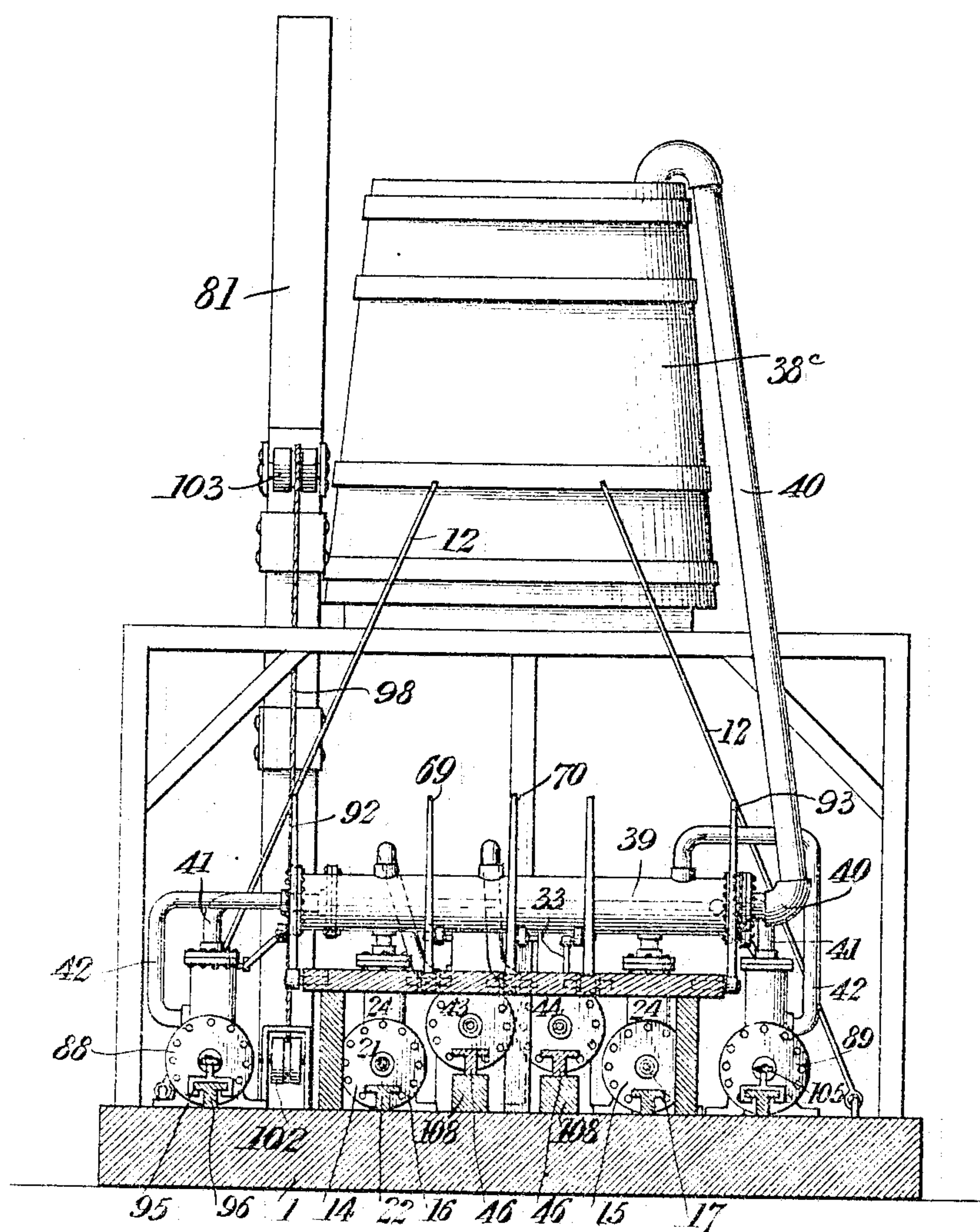
No. 781,738.

PATENTED FEB. 7, 1905.

N. D. PETRIE.
EXCAVATING MACHINE.
APPLICATION FILED APR. 2, 1904.

6 SHEETS—SHEET 5.

Fig. 3.



Witnesses:
E. J. Stewart
R. M. Elliott

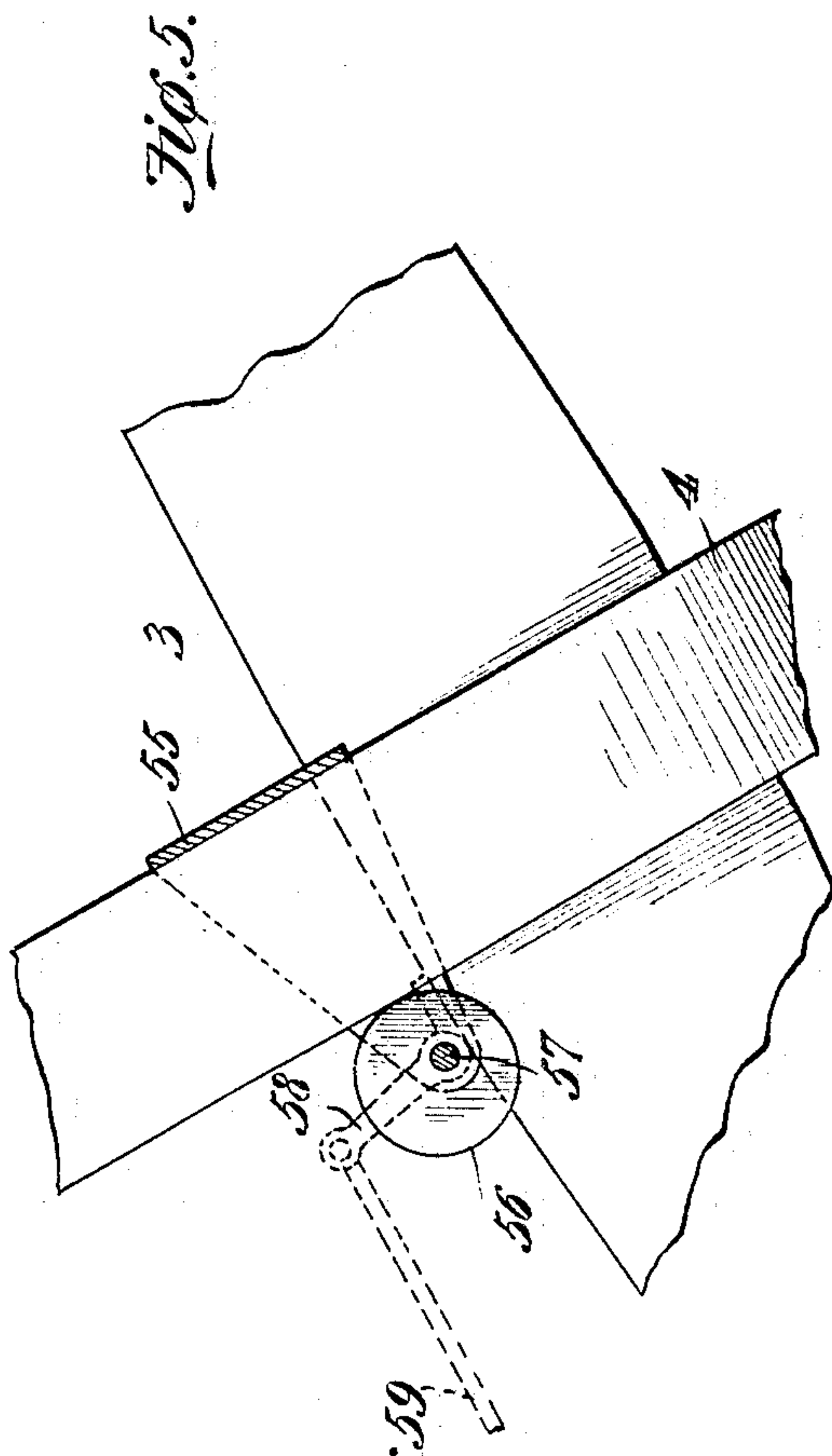
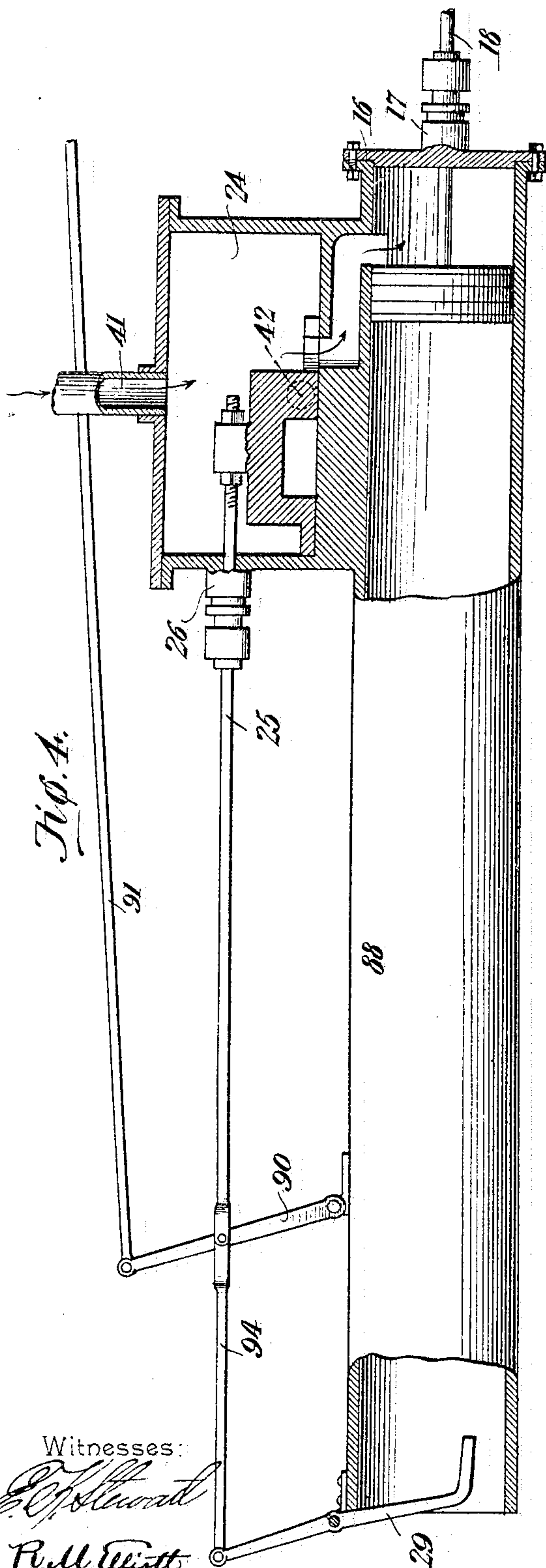
Newton D. Petrie Inventor,
by *C. A. Snow & Co.* Attorneys.

No. 781,738.

PATENTED FEB. 7, 1905.

N. D. PETRIE.
EXCAVATING MACHINE.
APPLICATION FILED APR. 2, 1904.

6 SHEETS—SHEET 6.



Witnesses:

E. J. Stewart
R. M. Elliott

Newton D. Petrie Inventor,
by *C. A. Snow & Co.* Attorneys.

UNITED STATES PATENT OFFICE.

NEWTON D. PETRIE, OF CELINA, OHIO.

EXCAVATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 781,738, dated February 7, 1905.

Application filed April 2, 1904. Serial No. 201,331.

To all whom it may concern:

Be it known that I, NEWTON D. PETRIE, a citizen of the United States, residing at Celina, in the county of Mercer and State of Ohio, have invented a new and useful Excavating-Machine, of which the following is a specification.

This invention relates to excavating-machines.

The objects of the invention are, in a machine of the class described, to simplify its construction and increase its efficiency, to minimize danger of breakage in use, to facilitate repairs when needed, practically to obviate wear of the power-transmitting parts, to effect automatic stoppage of an operative part when it shall have performed its function, to reduce the number of attendants necessary to operate it, and generally to improve and render more positive the operations of this class of machines.

With the above and other objects in view, as will appear as the nature of the invention is better understood, the same consists in the novel construction and combination of parts of an excavating-machine, as will be hereinafter fully described and claimed.

In the accompanying drawings, forming a part of this specification, and in which like characters of reference indicate corresponding parts, there is illustrated one form of embodiment of the invention capable of carrying the same into practical operation, it being understood that the elements therein exhibited may be varied or changed as to shape, proportion, and exact manner of assemblage without departing from the spirit thereof.

In the drawings, Figure 1 is a view in plan of the rear portion of the machine. Fig. 1^a is a view in plan of the front portion of the machine. Fig. 2 is a view in side elevation of the rear portion of the machine. Fig. 2^a is a view in side elevation of the front portion of the machine. Fig. 3 is a view in transverse section looking toward the stern of the dredge. Fig. 4 is a view in elevation, partly in section, of one of the cylinders, showing more particularly the arrangement of the valve-casing and the automatic cut-off coacting with the valve thereof. Fig. 5 is a de-

tached detail view showing the means for clamping the dipper-arm at any desired adjustment.

Referring to the drawings, 1 designates a scow or barge constituting the supporting structure for the operating mechanism of the excavator. This scow may be of the usual or any preferred construction and may be provided with propelling mechanism or not, as may be preferred. As the supporting structure *per se* forms no part of the present invention, further description thereof is deemed unnecessary.

At the forward end or bow of the scow is arranged a turn-table 2 of any preferred construction, upon which is supported a crane 3, the latter consisting in this instance of two spaced beams between which works the dipper-arm 4, supporting at its lower end a dipper or scoop 5 of any preferred design. The lower portion of the crane is stayed by guy-rods 6, connected with the turn-table and with the crane, and the upper end of the crane is braced against sagging through the medium of guy-rods 7, one terminal of each of which is secured to the crane near its free end and the opposite end of each to a lever 8, which is fulcrumed upon a vertical pivot 9, carried by a post 10, the post being secured between the upper ends of a pair of angularly-disposed brace-beams 11, the lower ends of which are secured to the sides of the scow. The brace-beams are held against yielding from the weight of the crane and its associated mechanism through the medium of guy-rods 12, secured at their upper ends to the post 9 and at their lower ends to the scow near its stern. The brace-beams 11 are still further stayed by guy-rods 13, secured to the post and to the sides of the forward portion of the scow.

The mechanism for swinging the crane from right to left comprises two cylinders 14 and 15, the cylinder 14 through mechanism actuated thereby operating to swing the crane to the right and the cylinder 15 through mechanism actuated thereby operating to swing the crane to the left. Each cylinder is open at its rear end and is closed at its forward end by a head 16, having a stuffing-box 17, in which works a piston-rod 18, carrying at one

end a piston of the usual or any preferred construction, and at its other end a cross-head 19, having a transversely-apertured extension 20, the cross-head being of the usual or any preferred construction and mounted for movement upon a guide 21, carried by a bed 22, bolted to the deck of the scow. Connected with the extensions 20 are the two ends of a chain 23, which passes around the turn-table and works in a circumferential groove therein, as shown. Each of the cylinders is provided near its forward end or that end adjacent to the cylinder-head with a valve-chest 24, in which is mounted a slide-valve of the usual or any preferred construction to control ports for supplying water in advance of the piston upon its operative stroke and for permitting escape of water from the cylinder upon the inoperative stroke of the piston. To each of these valves is connected a valve-stem 25, which works in a suitable stuffing-box 26, the outer end of each of the valve-stems being secured to a crank-shaft 27, supported in suitable standards 28, carried by the cylinders, the cranks being disposed in opposite directions, so that the movement of one valve-stem, which operates to supply water to a cylinder, will cause a movement of the other valve-stem to permit discharge of water from the other cylinder, it being seen that the two cylinders must act in unison in order to prevent interference—that is to say, when one cylinder is receiving water the other cylinder must be discharging water—thus to permit the crane to be swung in the direction desired. At the rear or open end of each cylinder is arranged an automatic valve shut-off, the same consisting of an approximately L-shaped lever 29, fulcrumed intermediate of its ends upon a shaft 30, working in bearings 31, carried by the cylinder, the lower or angle arm of the lever being so disposed as to cause it to be engaged by the piston when the latter reaches a point near the limit of its rearward stroke, thus to rock the crank-shaft 27 and cut off supply of water to the cylinder that is operating, thereby in a positive manner to prevent any overthrow or overreciprocation of the piston which would result in damage to the cross-head, cylinder-head, and stuffing-box of that cylinder. The connection between the lever 29 and the crank-shaft is secured through a link 32, connected with the parts in such manner as to permit free movement. The manual opening of the valve of either cylinder is secured through the medium of a rod 33, one end of which is connected with an arm 34, carried by the crank-shaft, and the other end with a lever 35, mounted for vibratory movement upon a platform 36. It will be seen that through the opposite disposition of the cranks of the shaft 27 when the lever 35 is moved in the direction to open the valve to supply water to one cylinder the valve in the other cylinder

will be moved in the direction to permit escape of water from that cylinder, and thus allow the crane to be swung in the direction required.

Water is supplied to the valve-chests of each of the cylinders of the apparatus from a distributing-header 37, which connects, through the medium of a pipe 38, with a force-pump 38^a, which latter connects, through a pipe 38^b, with a tank 38^c, containing filtered water. The water is discharged from the valve-chests of each of the cylinders of the apparatus through a discharge-header 39, which connects, through the medium of a pipe 40, with the said tank. As the connection between the various valve-chests and the distributing and discharge header is the same, to obviate repetition it may be stated at this point that water is supplied to each valve-chest through the medium of a supply-pipe 41, connecting with the distributing-header and with the upper portion of the valve-chest, and water is discharged from each of the valve-chests through a discharge-pipe 42, connecting the discharge-header and the lower portion of the valve-chest. The arrangement of these supply and discharge pipes herein shown is purely arbitrary and may be varied according to the requirements of the case without departing from the spirit of the invention.

The means for operating the dipper or scoop to cause it to take a fresh charge and to lift the dipper and its charge comprises two cylinders 43 and 44, the cylinder 43 and its appurtenances constituting the dipper retracting and tilting mechanism and the cylinder 44 and its appurtenances constituting the dipper projecting and hoisting mechanism. Each of these cylinders, as also those presently to be described, is provided with operative parts such as those discussed in connection with cylinders 14 and 15, and therefore needs no further description. The piston-rod of each of the cylinders has a cross-head 45, which works upon a guide 46, such as that described, and each cross-head carries a sheave-block 47 and 48, respectively, the sheaves 49 of which are horizontally disposed, the sheave-block 47 being carried by the piston-rod of the cylinder 43 and the sheave-block 48 being carried by the piston-rod of the cylinder 44. Around the sheave 47 passes the bight of a chain or cable 50, one end of which is attached to a post 51, secured to the deck of the scow. This chain or cable passes between a pair of sheaves 52, carried by a double-sheave block 53, supported upon the turn-table, the chain or cable being secured to the dipper-arm near its lower end at 54. The chain 50 serves to retract the dipper to cause it to take a fresh charge of earth and operates when the piston of the cylinder 43 is moved backward. When this movement of the piston takes place, draft is applied to the chain 50, thereby exerting a

backward pull upon the dipper-arm and causing it to be moved to the position indicated in dotted lines in Fig. 2^a. To facilitate movement of the arm between the crane members, there is provided a pivoted yoke 55, between the members of which the arm works, and in order to hold the arm in adjusted position, thus to prevent the scoop from entering too deeply into the earth, which might result in its breakage, there is a locking device combined with the yoke for this purpose. This device comprises an eccentric 56, which is mounted upon the shaft 57 of the yoke, one end of the shaft being provided with a crank-arm 58, to which is connected one end of a rod 59, the other end of which is connected with a lever 60, carried by the crane. By rocking the lever in the appropriate direction the eccentric is caused to clamp the dipper-arm in the yoke, and thus hold it from any longitudinal movement with relation thereto.

The sheave of the piston-rod of the cylinder 44 is engaged by the bight of a chain or cable 61, one end of which is attached to a post 62, secured to the deck of the scow, the free end of the chain or cable being passed between two sheaves 63, carried by the double-sheave block 53, thence up between the members of the crane and over a grooved roller 64, carried by the upper end of the crane, and thence down and secured to the bail 65 of the dipper. In order to obviate any interference between the chain or cable 61 and the dipper-arm, the latter is bifurcated throughout the greater portion of its length, and between this bifurcation the said chain or cable works as the dipper-arm is moved up and down. To hold the chain or cable 61 from working against the sheave-block 53, there is a grooved roller 65' arranged near the lower end of the crane, against which the said chain bears, and to hold the chain or cable 50 out of engagement with the grooved roller 65' there is a pair of grooved rollers 66, disposed on the under side of the lower portion of the crane, between which the chain or cable 50 is passed. When the piston-rod of the cylinder 44 is moved backward, draft is applied to the chain or cable 61, causing it to move the dipper forward, and thus take up a fresh charge of earth, and upon further movement of the piston causes the dipper to be raised to the desired height, whereupon the crane is swung in the manner already described and the earth is discharged. The discharge is secured through the medium of a trip-cord 67, which is connected in the usual manner with the bottom 68 of the dipper.

The valves in the valve-chests of the cylinders 43 and 44 are actuated through the medium of levers 69 and 70, the lever 69 having connected with it one end of a rod 71, the other end of which is connected with a rocking arm 72, carried by the cylinder 43, said rod being connected with the valve shut-off

29 through the medium of a rod 73. The lever 70 has connected with it one end of a rod 74, the other end of which is connected with a rocking arm 75, mounted upon the cylinder 44, the connection between the rocking arm 70 and the valve shut-off being effected through the medium of a rod 76.

Instead of employing two levers 69 and 70 for operating the valves of the cylinders 43 and 44 either of these levers may be omitted and both of the valves be operated from a single lever, and this may be effected by the employment of a pivoted arm or plate 77, carried by a standard 78, supported by the cylinders 43 and 44. To one end of the arm is connected a link 79, which extends forwardly and connects with the rocking arm 72, and with the other end of the arm 77 is connected a link 80, which extends rearwardly and connects with the rocking arm 75. It will be seen by this arrangement that when, say, the lever 69 is operated the valve in the cylinder 43 will be, say, opened and that of the cylinder 44 closed, and vice versa. While this arrangement of valve-operating mechanism is advantageous, it is to be understood that, if preferred, two levers may be employed and still be within the scope of the invention.

As is common with all structures of this character, means must be employed for anchoring or mooring the scow at the point of work, and this is effected in this instance by three vertically-disposed poles 81, 82, and 83, the poles 82 and 83 being disposed at the bow of the scow and the pole 81 at the stern. While there is but one pole shown at the stern of the scow, it is to be understood that two may be employed and still be within the scope of the invention. These poles are held in position by a frame 84, comprising two uprights 85 and a cross-piece 86, connecting the uprights and rendering them rigid, and each upright carries a plurality of guides 87 in the nature of yokes in which the poles work. In order that either of the poles or anchors may be operated independently of the other, two cylinders 88 and 89 are provided for the purpose, the cylinder 88 and its appurtenances operating the right-hand forward anchor and rear anchor and the cylinder 89 and its appurtenances operating the left-hand forward anchor. These cylinders and their appurtenances are constructed and operate in the same manner as the cylinders 43 and 44—that is to say, each cylinder carries a rocking arm 90, to which is connected one end of a rod 91, the opposite ends of which are connected, respectively, to levers 92 and 93 for actuating the valves of the respective cylinders. The connection between the rocking arm of each cylinder and the valve shut-off is effected through the medium of a rod 94, as already described. The piston-rod of the cylinder 88 carries a cross-head 95 and works upon a guide 96, as described, and the outer end of the piston-rod

carries an eye 97, to which is connected the bend of a chain or cable 98, one end of the rope being passed around a grooved roller 99, mounted upon the deck, and thence over a grooved roller 100, carried by one of the up-
 5 rights 85 and has its free end secured to the pole 82. The other end of the chain or cable passes around the grooved roller 101, secured to the deck, thence rearward and around another grooved roller 102, secured to the deck,
 10 thence upward and around a grooved roller 103, carried by the upright and the rear anchor, and thence secured to said another. By this arrangement when the piston-rods of the cylinders 88 are moved forward the right-hand anchor and stern anchor will drop, and thus
 15 moor the scow at the desired position. Upon the reverse movement of the piston-rod of the cylinder the anchors will be raised. The piston-rod of the cylinder 89 is constructed and mounted for movement in the same manner
 20 as that of the cylinder 88, and to an eye 104, carried by this piston-rod, is connected one end of a chain or cable 105, the other end of chain being passed around a grooved roller
 25 106, carried by the deck, thence up and around a grooved roller 107, carried by the left-hand upright, and thence secured to the left-hand anchor. When the piston-rod of the cylinder
 30 89 is moved forward, the anchor will be dropped and upon reverse movement it will be raised.

As will be seen by the drawings, the cylinders 43 and 44 are mounted upon bed-blocks
 35 108, and these serve to elevate them, so as to bring their piston-rods into proper alinement with relation to the sheave-block 53, while the remaining cylinders are bolted or otherwise secured to the deck of the scow, as clearly
 40 shown in Fig. 3.

It will be seen from the foregoing description that all the parts of this apparatus are certain and positive of operation and by the simplicity of their construction are not liable
 45 to get out of repair from long continued use, and, further, in case of damage or breakage repairs may readily be effected.

Having thus fully described my invention, what I claim is—

50 1. In an excavating-machine, a turn-table supporting the dredging mechanism, a pair of cylinders, a connection between the piston-rods of the cylinders and the turn-table, and means for supplying water under pressure to
 55 either the cylinders to the exclusion of the other, thus to effect rotation of the turn-table.

2. In an excavating-machine, a turn-table supporting the dredging mechanism, a pair of cylinders, a connection between the piston-
 60 rods of the cylinders and the turn-table, means

for supplying water under pressure to either the cylinders to the exclusion of the other thus to effect rotation of the turn-table, and means actuated by the driven piston to effect automatic shutting off of the water to that
 65 cylinder.

3. In an excavating-machine, a turn-table, a crane supported thereby and carrying a dipper or scoop, a pair of cylinders having their piston-rods operatively connected with the
 70 turn-table, a second pair of cylinders having their pistons operatively connected with the dipper or scoop, means for supplying water to either of the first-named cylinders to the exclusion of the other to cause rotation of the
 75 turn-table, means for supplying water to one of the second-named cylinders to cause the retracting and tilting of the dipper, and means for supplying water to the other of the second-named cylinders to cause projection and hoist-
 80 ing of the dipper.

4. In an excavating-machine, a crane mounted for swinging movement, a dipper or scoop supported by the crane, a cylinder the piston-rod of which is operatively connected with
 85 the dipper-arm to effect retraction and tilting of the dipper, a second cylinder the piston-rod of which is operatively connected with the scoop to effect projecting and hoisting thereof, and means for independently supply-
 90 ing water under pressure to either of the cylinders to cause operation of its piston.

5. In an excavating-machine, a crane mounted for swinging movement, a dipper or scoop supported by the crane, a cylinder the piston-rod of which is operatively connected with
 95 the dipper-arm to effect retraction and tilting of the dipper, a second cylinder the piston-rod of which is operatively connected with the scoop to effect projecting and hoisting
 100 thereof, means for independently supplying water under pressure to either of the cylinders to cause operation of its piston, and means for automatically cutting off the supply of water to the operating-cylinder when its piston reaches the limit of its movement.

6. In an excavating-machine, fore-and-aft anchors, a pair of cylinders one of which has its piston-rod operatively connected with two
 105 of the anchors, and the other having its piston-rod connected with one of the anchors, and means for supplying water under pressure to the cylinder to cause raising of the anchors.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

NEWTON D. PETRIE.

Witnesses:

P. E. MARSH,

NELSON MAFFETT.