

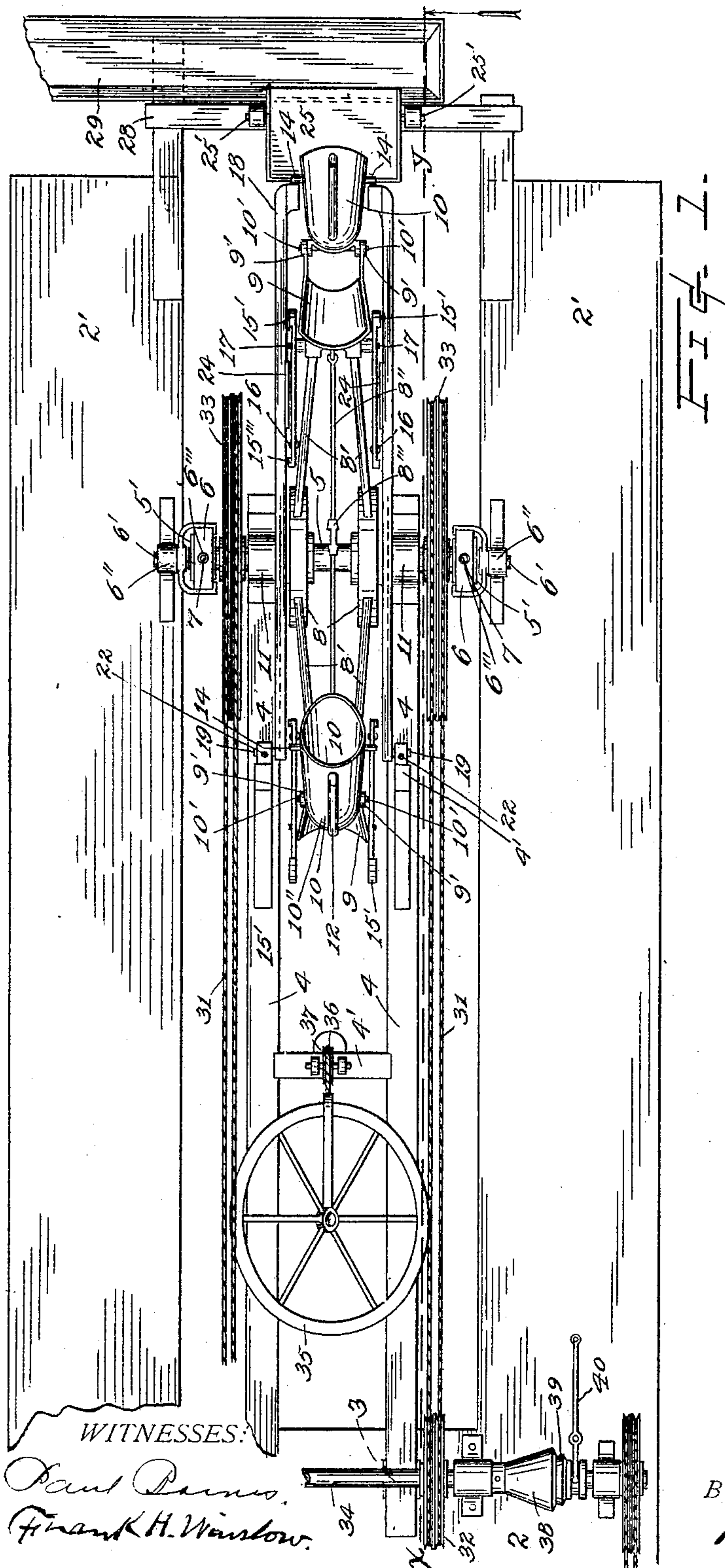
No. 814,270.

PATENTED MAR. 6, 1906.

C. E. S. BURCH.
DREDGING MACHINE.

APPLICATION FILED JULY 12, 1904.

2 SHEETS—SHEET 1.



WITNESSES:

Paul Barnes,
Frank H. Winslow.

Fig. 1.

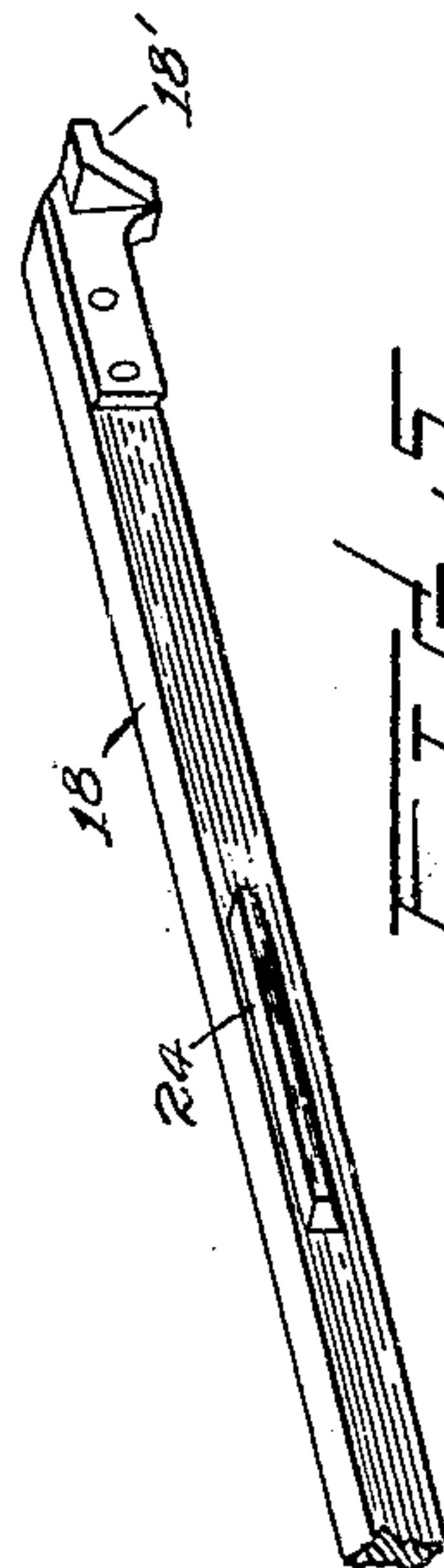


Fig. 5.

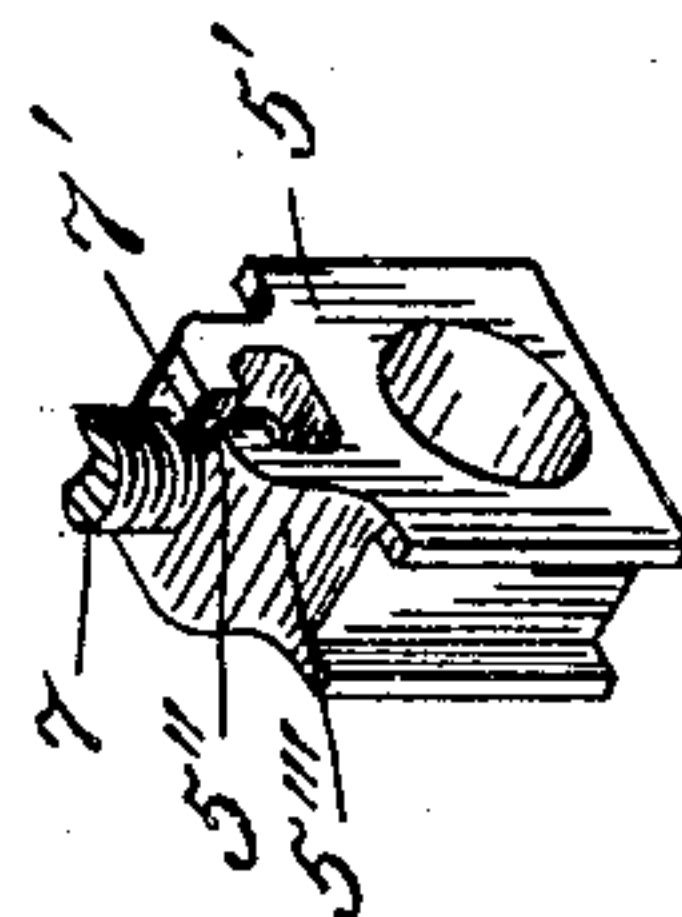


Fig. 4.

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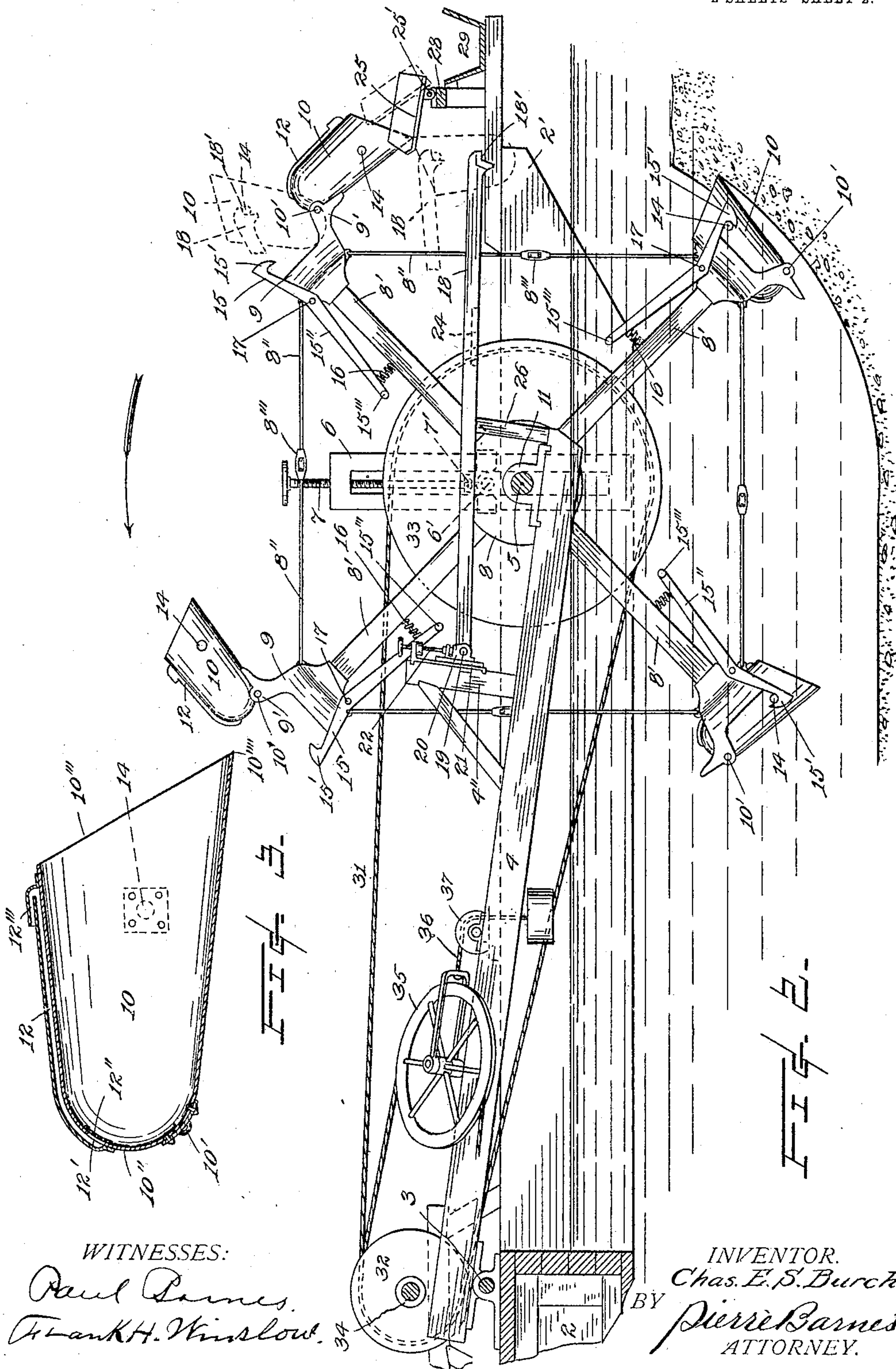
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2 SHEETS—SHEET 2.



UNITED STATES PATENT OFFICE.

CHARLES E. S. BURCH, OF SEATTLE, WASHINGTON.

DREDGING-MACHINE.

No. 814,270.

Specification of Letters Patent.

Patented March 6, 1906.

Application filed July 12, 1904. Serial No. 216,201.

To all whom it may concern:

Be it known that I, CHARLES E. S. BURCH, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Dredging-Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

10 In said drawings, Figure 1 is a plan view of apparatus embodying my invention. Fig. 2 is a longitudinal vertical section taken on line *xy* of Fig. 1. Fig. 3 is an enlarged longitudinal section of one of the excavating-buckets. 15 Figs. 4 and 5 are perspective views of details shown in Figs. 1 and 2.

This invention relates to dredges, and more particularly to that class employed in excavating auriferous material.

20 Under prevailing conditions the precious metals are ordinarily found in compact ground containing heavy gravel or boulders, and all of the power-excavating machines heretofore in use and known to me are incapable of digging therein without a previous 25 breaking of the ground, thereby disturbing and causing the relatively heavier particles of contained gold to gravitate below or outside the range of their hoisting-buckets, and thus excavating material with little or no 30 gold, even when working in rich ground. Furthermore, under the constructions above alluded to such gold as may be collected within their buckets is commonly lost through 35 the interstices thereof or through displacement by the accompanying boulders, and this is particularly true where a large proportion of the load is composed of water.

The objects of the present invention are, 40 first, to provide means capable of simultaneously digging and excavating all characters of ground at a low cost; second, to facilitate the charging and discharging of the buckets of the excavated material by the provision of 45 means to exhaust all water and air from the interior of the buckets during the loading process and admitting air when emptying, and, third, to so form and assemble the various parts that the apparatus will operate 50 with a minimum of power uninterruptedly and to the best advantage.

With these and other ends in view the invention consists in the novel construction and combinations of parts, as will be herein- 55 after described and claimed.

Referring again to the drawings, 2 indicates

a float of suitable construction and shape and provided with a bifurcated bow having forwardly-protruding ends 2'. Hinged to the float, as at 3, and between the said ends 60 is a forwardly-extending rigid frame comprising two longitudinal members 4 and a suitable number of cross-tie members, such as 4'. A shaft 5 extends transversely across said frame and is journaled in boxes 11, secured to and swinging with the latter. 65 The extreme ends of this shaft are housed in sliding boxes 5', vertically movable in upright guide-frames 6, pivotally connected by trunnions 6' to socket-supports 6'', fixedly secured to float ends 2', whereby the guides 70 may oscillate to accommodate themselves to the arc of travel of said shaft as it is raised or lowered, according to the depth of the desired excavating cut. An advantageous 75 manner of accomplishing elevation or depression of the shaft and connecting parts is by the use of screws 7, passing through screw-threaded apertures 6''' of these guide-frames and rotatably connected at their lower 80 ends to said sliding boxes. This connection (see Fig. 4) is preferably attained by forming a peripheral groove 7' in each of said screws to receive the sides of slots 5'', formed or provided in recessed offsets 5''' of the boxes. 85 Fixedly mounted upon the shaft are bosses or disk webs 8, carrying a plurality of radial spokes 8', which are connected in proximity of their outer ends by suitable braces, such as rods 8'', severally provided with turnbuckles 90 8''' and constituting a wheel-frame. Upon the outer ends of said spokes are tangentially arranged concave bolsters 9, which respectively provide beds or seats for excavating-buckets 10, tiltably connected thereto by 95 pivots 10', passing through lugs 9' of the bolsters. Said buckets are severally constructed with truncated conical main portions, which terminate at their following ends in semiglobular walls 10'' and at the opposite 100 or advance ends in rim edges 10''', inclined from planes projected longitudinally through their several axes to provide a shovel-like and forwardly-protruding cutting edge 10'''. (See Fig. 3.) 105

12 indicates longitudinally-disposed air and water conduits, attached or provided upon the circular walls of the buckets and extending around upon the walls 10'', where they 110 communicate with the interiors of the buckets by apertures 12', which are guarded by strainers or screens 12''. The other ends 12'''

of these conduits are bent back, so that the orifices thereat will face in the opposite direction to the travel of the buckets. The object of these conduits is to permit the untar-
 5 tard escape of the air from the buckets as they become submerged, and also of the water as the excavated dirt enters, and to readmit air to replace the loads as the buckets are
 10 dumped. Lateral studs 14 project from said buckets and are positioned so as to be engaged, when the buckets are seated in their respective aforesaid bolsters, by hooked ends
 15 15' of locking-levers 15. These levers are fulcrumed at 17 to the bolsters or the wheel-spokes 8' and are normally held in engagement or in position for engagement with said
 20 studs by the action of compression-springs 16, placed between lever-arms 15'' oppositely of said hooks and the wheel-spokes 8', as plainly shown in Fig. 2.

An oscillatory arm 18 is provided upon each side of the wheel, and these arms are hinged to the rear of and above vertical and
 25 horizontal planes extended through axis of the shaft on pivots 19, carried in boxes 20, vertically slidable in suitable guides 21, secured to posts 4'' on frame members 4. 22 indicates screws operating in fixed nuts of
 30 these guides for adjustably raising and lowering the pivot-boxes 20 to accommodate the heights thereof according to the adjusted elevation of the wheel, as aforesaid. These
 35 arms 18 extend forward of the shaft and have in their extreme forward ends angular notches 18'. Intermediate the lengths of the
 40 arms are laterally-protruding shelf-pieces 24, adapted to be engaged by oppositely-projecting studs 15''' of the lever-arms 15'', whereby as the latter revolve they impinge against
 45 said shelf-pieces and through the weight of the boom disconnect the engaged hook from the respective bucket against the action of the springs 16. After the hooks have been
 50 disconnected from the bucket-studs, as above described, the wheel continuing to rotate causes the studs 14 to be engaged within
 55 notches 18' of arms 18 and raise the latter, which in ascending gradually tilt the bucket acted upon outwardly until it is unbalanced and overturns the same to discharge its con-
 60 tents upon a tilting platform 25. As these arms ascend the studs 15''' travel transversely across and beyond the boom-shelves 24 and are disengaged therefrom shortly
 65 after the overturning of the respective buckets, as aforementioned, when said springs assert themselves to throw the hook-levers back in their normal positions and the studs 15''' out of the path of the shelves in order
 not to interfere with the descent of the arms, which occur immediately after the overturning of the several buckets. Supporting-pedestals 26 are provided on the frame members 4 to limit the downward travel of arms 18
 and retain them in readiness for engagement

with the next following bucket. The buckets are so pivoted to the bolster-lugs that vertical lines extended through the centers of gravity of the respective loaded buckets will in their upward travel be positioned between
 70 the pivotal points of the buckets and wheel-axis, and in consequence the bucket-studs 14 are reliably held against the ends of the arms until after the buckets have been raised
 75 above the aforesaid platform, when, as previously mentioned, these studs are thrust outwardly by the arms to overturn the buckets to discharge their loads, and as the empty
 80 buckets move across the top of the wheel and beyond the center of their revolution the weight of the buckets assert themselves to cause the same to swing over into operative
 85 cutting position in the bolsters, and in so doing the studs come in contact with sloping terminal ends of the hooks 15 and swerve the latter to permit the studs passing thereunder and be locked.

The platform 25 is hinged by trunnions 25', located somewhat forward of its medial line, to a superstructure 28 of the float ends 2', and
 90 while normally lying at a slight incline from the horizontal is adapted to have its rear and heavier end tilted up to dump any material deposited thereupon by being contacted by
 95 and shoved up with an ascending bucket. Upon a bucket passing by the platform the latter quickly returns to its former position and within the circular path of the bucket's travel to receive the dirt or gravel. A trough
 100 29, through which may pass a conveyer-chain, (not shown,) conveys the excavated material to a convenient dump or scow.

Devices for rotating the wheel may be of any powerful and suitable type and may advantageously consist of a cable transmission
 105 system, such as illustrated in the drawings, though I do not wish to confine myself to the same. The illustrated system comprises an endless cable 31, passing, respectively, around
 110 driving and driven sheaves 32 and 33, fixedly mounted upon a two-part shaft 34 and the wheel-shaft 5 and likewise about a tightener-sheave 35, wherewith tension is imparted to the cable by the ordinary expedient of a
 115 weighted line 36 over a sheave 37. The shaft 34 is driven in any suitable and convenient manner from a power-motor, and in order that the excavating devices may be at all times under the sensitive control of the operator I include means to disconnect and couple
 120 the two parts of this shaft without interrupting the movement of the driving-motor. Such connecting means may consist of any efficient type of coupling or clutch; but I prefer to use a cup-coupling, whereof 38 is a
 125 chambered sleeve, rigidly secured to one part of the shaft, and 39 is a tapering sleeve, registering in the other sleeve and so splined to its part of the shaft as to rotate in unison therewith, but free to be moved endwise for the
 130

purpose mentioned and can be manipulated by a shifting-lever 40, as usual.

The operation of the invention will be understood from the foregoing, and it is capable of accomplishing a great amount and variety of digging and excavating work, both on land and under water. For instance, the float carrying the apparatus may be so held by spuds or lines at a pivotal point in proximity of its rear end and by take-up and controlling lines adjacent of its forward end that the float supporting the dredging apparatus can be swung around to make an extended arc-shaped cut, which may be accomplished even during a rotation of the wheel by taking advantage of an interval between the shoveling operations of consecutively-revolving buckets, and the float can from time to time be readily advanced or moved laterally for a new segmental cut.

It is obvious that the digging and excavating with this invention, being performed by a continuous series of revolving cutting and hoisting operations enables the apparatus to be actuated at a greater velocity of speed than is possible where reciprocating or other movements are employed, and hence smaller buckets may be utilized with my invention and yet accomplish a greater amount of work in a given time.

While the invention is of extreme usefulness in all classes of dredging, it is particularly adapted for gold-mining, inasmuch as it is capable of working in a breast of a bank, either above or below water, and in advance of apparatus. Also from the fact that the digging and filling operations of the bucket are coincident it is particularly adapted for under-water gold-dredging, as the dirt is not sufficiently agitated prior to its entering the buckets to cause it to mix with the water and precipitate the gold outside of the reach of the buckets. Another advantage is found in the construction of the bucket, which presents a scoop-like penetrating cutting or digging edge and likewise being formed with a closed rear end affords no escape-passage for collected gold and yet at the proper moment accomplishes the discharge thereof with despatch by the provision of the described vent connections.

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

1. In a dredging-machine, the combination with a suitable float and power devices, of a wheel rotatably mounted on a swinging frame carried by said float, power-transmission devices connecting said wheel to said power devices, and means carried peripherally of the wheel and movable outwardly from the periphery of the wheel for digging and hoisting the material being excavated.

2. In a dredging-machine, the combination with a swinging frame, devices for rais-

ing and lowering said frame, and power-transmission devices, of a wheel mounted rotatably upon said frame and carrying peripherally thereof a plurality of tilting excavating-buckets arranged to tilt outwardly from the periphery of the wheel, means for detachably retaining said buckets in operative digging positions and means for overturning said buckets.

3. In a dredging-machine, the combination with a wheel, and means for imparting a rotary motion thereto, of a plurality of tiltable excavating-buckets carried peripherally of and with the wheel and adapted to tilt outwardly from the periphery of the wheel, means to detachably retain said buckets in operative cutting positions, means for disengaging said retaining means, and means for overturning the buckets.

4. In a dredging-machine, the combination with a wheel and means to rotate the same, of tiltable buckets disposed peripherally of the wheel, hook devices for engaging and locking said buckets in their operative cutting positions, and means comprising a swinging arm or arms for disengaging said hook devices from and also for overturning the buckets.

5. In a dredging-machine, the combination with a suitable float and power devices, of a wheel rotatably mounted on the float and carrying on its periphery a plurality of tiltable excavating-buckets, mounted so as to tilt outwardly from the periphery of the wheel, means to raise and lower said wheel relatively of the float and means to tilt said buckets.

6. In a dredging-machine, an excavating-wheel, comprising in combination, of a shaft, disks mounted on said shaft, spokes carried by said disks, bolsters secured to the spokes, a bucket hinged to each of said bolsters and adapted to tilt outwardly and beyond the periphery of the wheel, and means for detachably retaining said buckets in their respective bolster-seats.

7. In a dredging-machine, the combination with a wheel carrying a plurality of tiltable excavating-buckets, constructed and arranged to tilt outwardly from the periphery of the wheel and locking devices for securing said buckets in their normal digging and filling positions, of means for disengaging said locking devices from the buckets.

8. In a dredging-machine, the combination with the swinging frame, the wheel rotatably mounted thereon and carrying peripherally thereof tiltable excavating-buckets, spring-actuated lock devices for detachably engaging studs projecting laterally of the buckets, of a swinging arm adapted to disengage said lock devices from said studs and also acting as an abutment whereby the said buckets are overturned.

9. In a dredging-machine, the combina-

tion with the float, a wheel rotatably mounted upon said float and carrying outwardly-tiltable excavating-buckets, means to secure said buckets in operative cutting position
5 and means to overturn said buckets as they revolvably ascend, of a movable platform projecting within the path of the buckets for receiving the excavated material from the same when they are overturned.

10 10. In a dredging-machine, the combination with an excavating-bucket, of an air-conduit extending approximately its entire

length and making communicative connection between the atmosphere adjacent of the open leading end of the bucket and with the interior of the bucket immediately inside of its closed end. 15

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

CHARLES E. S. BURCH.

Witnesses:

PIERRE BARNES,
F. C. PARK.