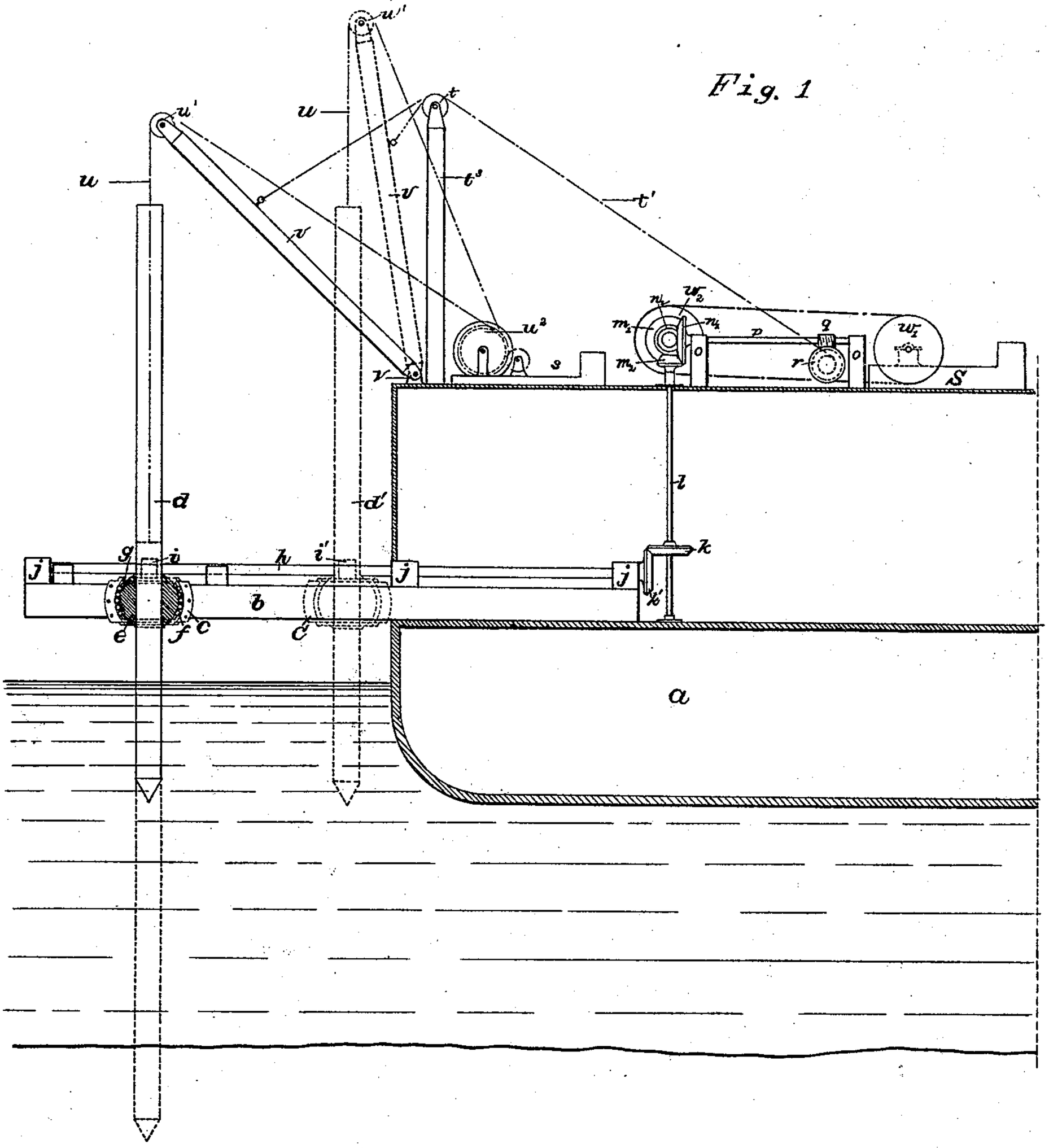
(No Model.) 3 Sheets—Sheet 1.

# G. H. TITCOMB.

## DREDGING MACHINE.

No. 515,379. Patented Feb. 27, 1894.

Fig. 1

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(No Model.) 3 Sheets—Sheet 2.

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## DREDGING MACHINE.

No. 515,379. Patented Feb. 27, 1894.

Fig. 2

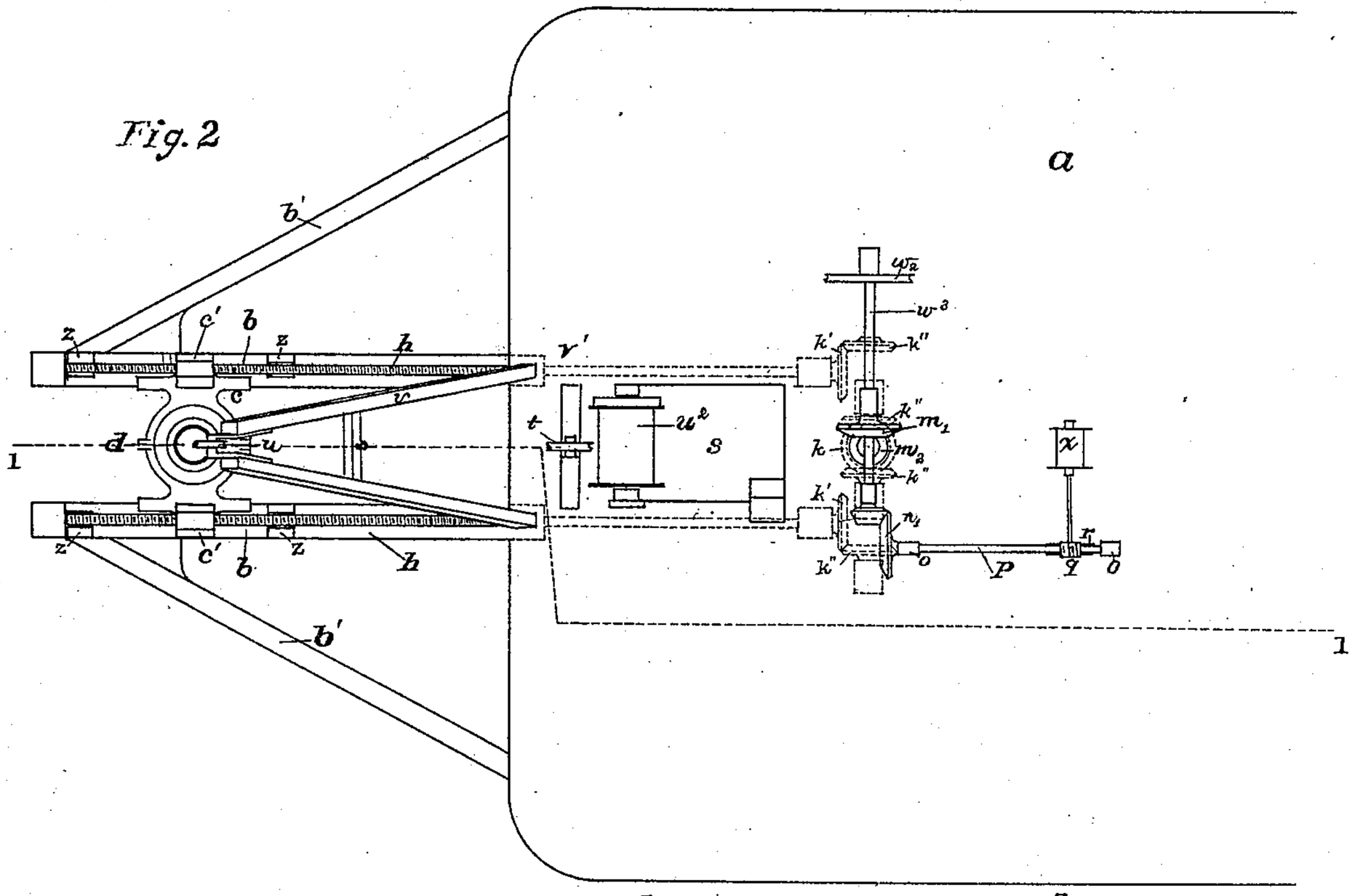



Fig. 3

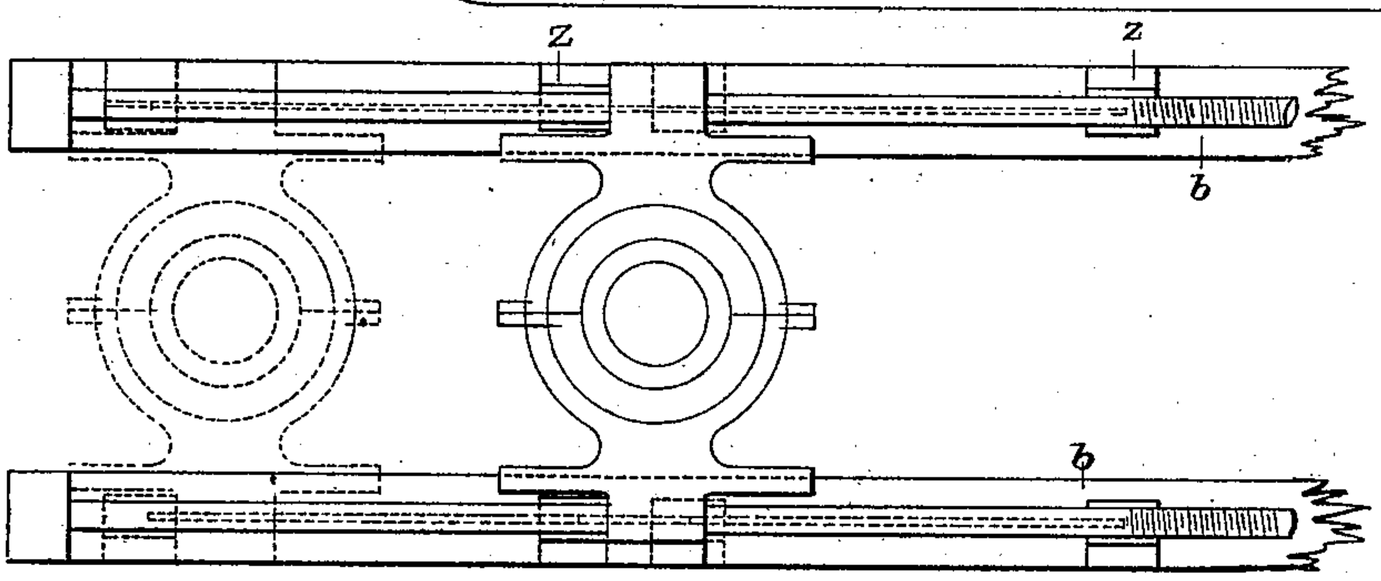
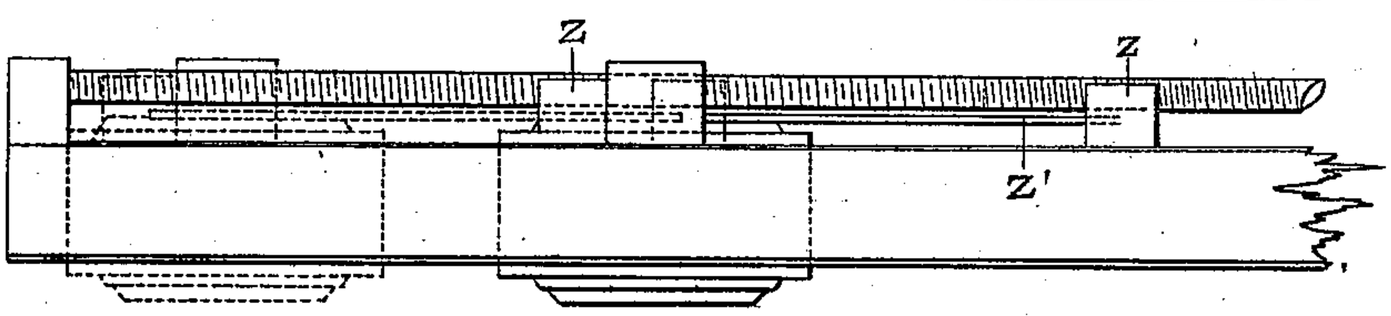



Fig. 4

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## DREDGING MACHINE.

No. 515,379. Patented Feb. 27, 1894.

Fig. 5

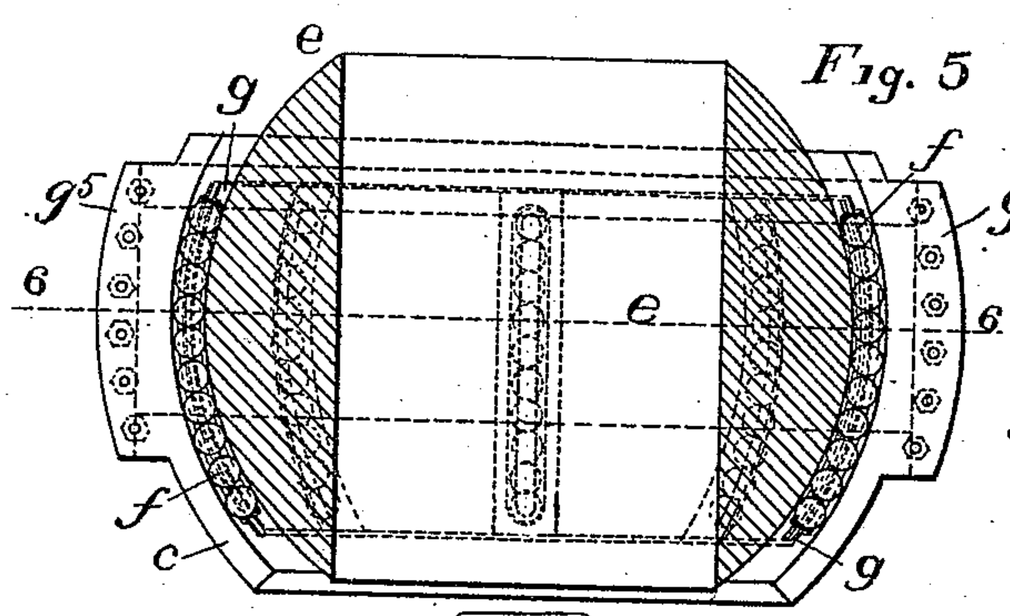



Fig. 7

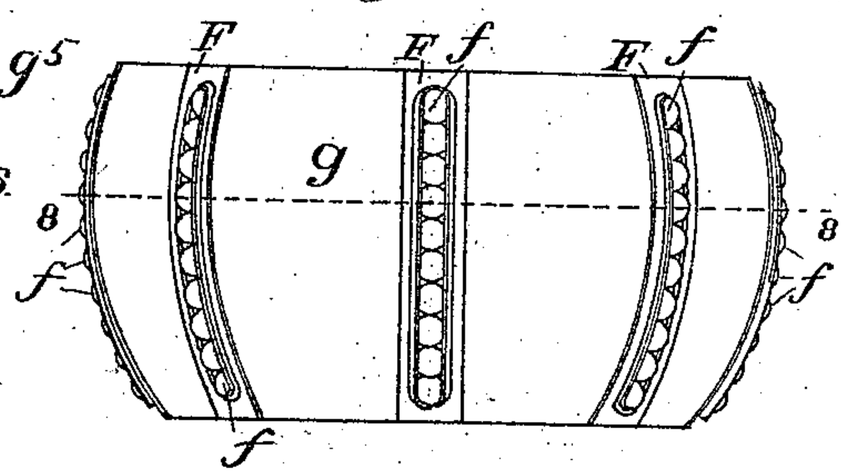



Fig. 6

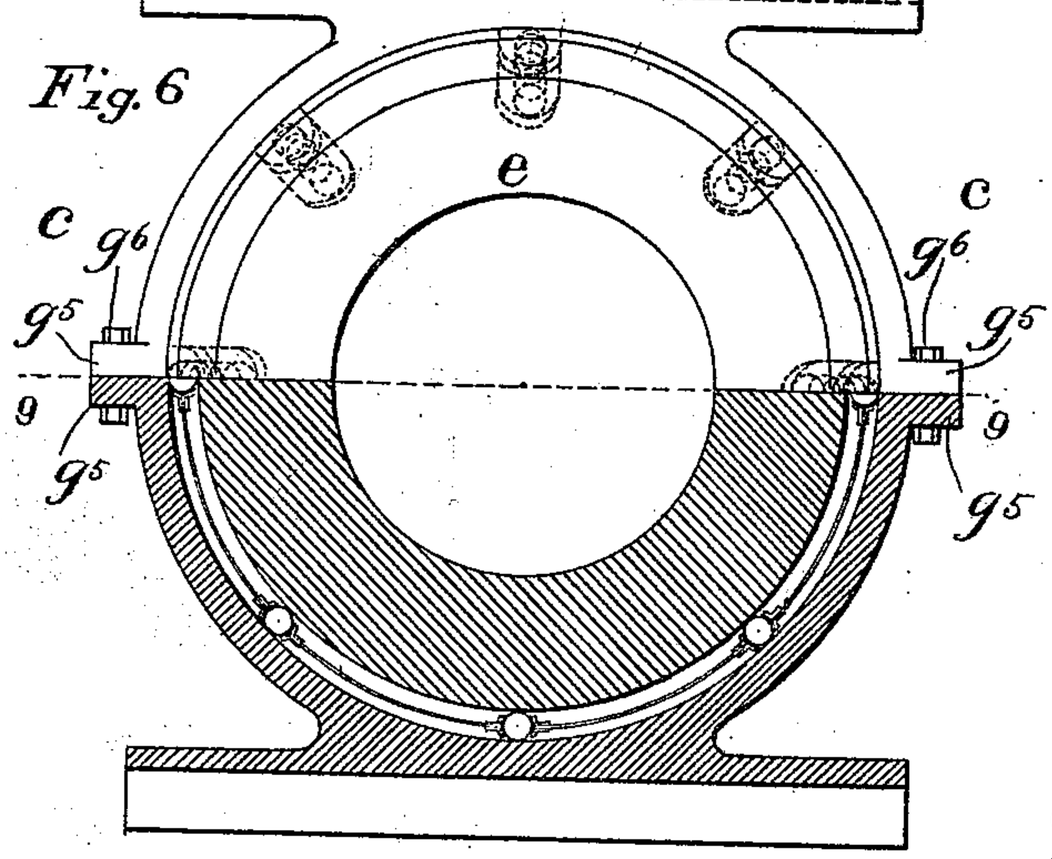
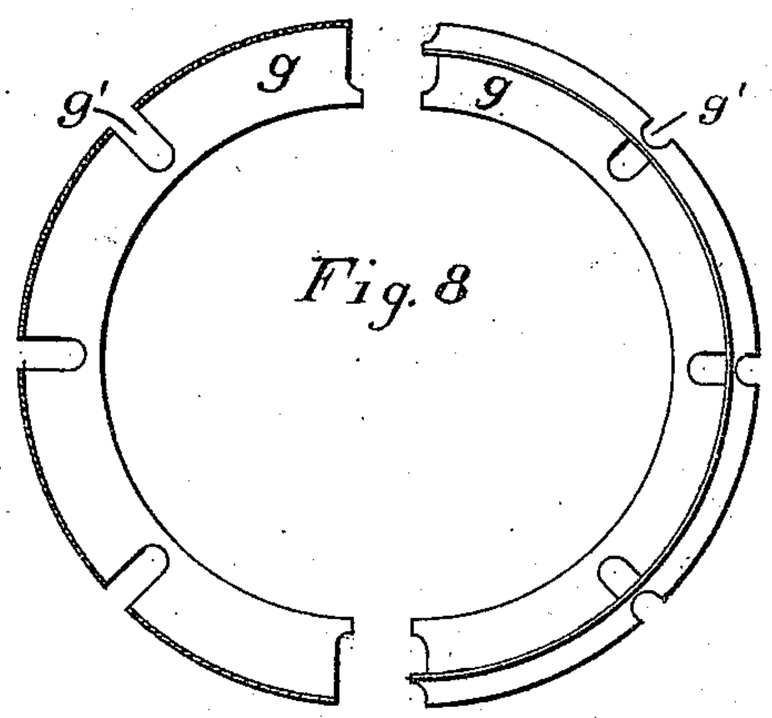



Fig. 8



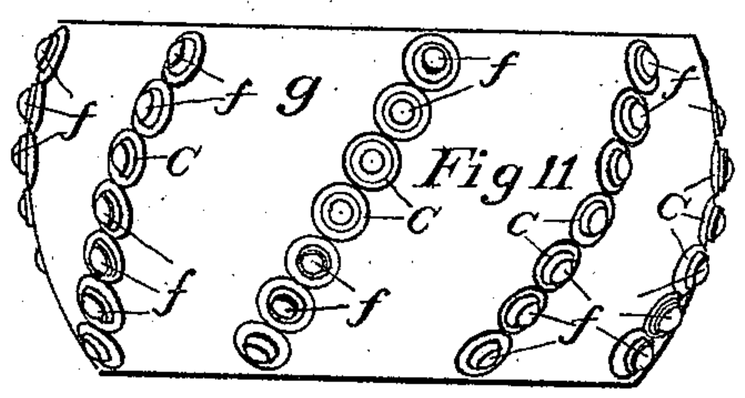




Fig 11

Fig 10

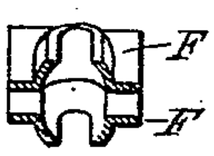



Fig. 9

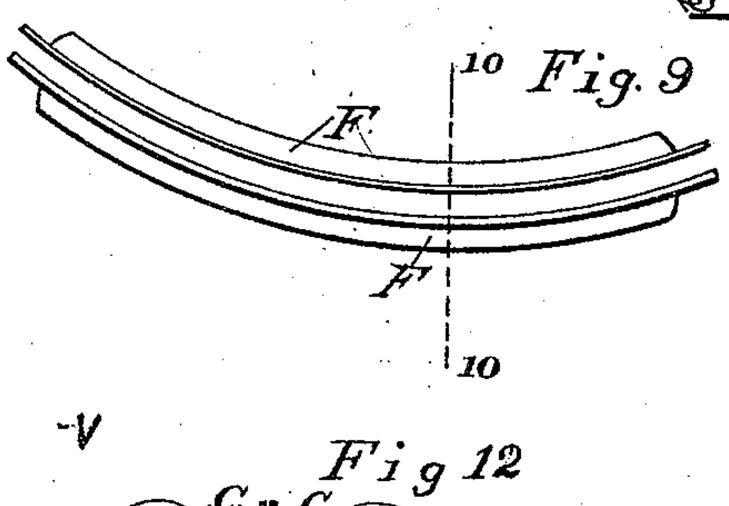



Fig 12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# UNITED STATES PATENT OFFICE.

GEORGE H. TITCOMB, OF BOSTON, MASSACHUSETTS.

## DREDGING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 515,379, dated February 27, 1894.

Application filed January 14, 1893. Serial No. 458,333. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE H. TITCOMB, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Dredging-Machines, of which the following is a specification.

This invention relates to means for engaging a dredging vessel with the bottom of the body of water in which it is located, so that the vessel may swing as on a pivot, and thus work progressively in dredging in the arc of a circle.

It is customary to provide a dredging vessel with a vertically-movable pointed bar, usually termed a spud, which is adapted to be projected below the bottom of the hull, and to be inserted in the bottom of the channel or body of water, said spud serving, when thus inserted, as a pivot on which the boat can turn or swing, so that the dredging apparatus at one end of the vessel may work progressively in the arc of a circle. Heretofore the spud has been arranged to work in a well or casing formed in the hull of the vessel, the upper portion of the spud being within the hull of the vessel when in use. This arrangement has been found to be objectionable, first, because the rolling or pitching motion of the vessel when the water is rough subjects the spud to a severe strain, rendering it liable to break; and, secondly, because the strain caused by the rolling of the vessel is liable to break the sleeve or casing affixed to the hull and surrounding the spud, thus causing the vessel to leak, this liability making it necessary to provide a water-tight compartment around the said spud and its inclosing sleeve.

My present invention has for its object to overcome the above-noted objections, and to this end it consists, as a whole, in a dredging vessel having a spud located outside of the hull of the vessel and preferably at the end thereof opposite the end from which the dredging apparatus works, said spud being vertically movable in a holder or guide, which is fitted to have a universal movement in a socket affixed to a frame projecting from the hull, so that the strain exerted on the spud by the rolling or pitching of the vessel is reduced to the minimum, the location of the spud outside of the hull preventing liability of injury to the hull by the spud.

The invention also consists in the provision of means for adjusting the spud and its guide toward and from the vessel, to enable the spud to impart a limited forward movement to the vessel to the extent required to feed the dredging apparatus forward from time to time.

The invention also consists in certain combinations of parts, all of which I will now proceed to describe and claim.

Of the accompanying drawings, forming part of this specification: Figure 1 represents a vertical section on the line 1—1 of Fig. 2. Fig. 2 represents a top plan view of a portion of a dredging vessel provided with my improvements. Fig. 3 represents an enlarged top view of the spud-guide and its supports. Fig. 4 represents a side view of the construction shown in Fig. 3. Fig. 5 represents an enlarged vertical section of the spud-guide and its socket. Fig. 6 represents a horizontal section on the line 6—6, Fig. 5, said section including one-half of the spud-guide and its socket, the other half being shown in plan view. Fig. 7 represents a side view of the frame or spider which holds the anti-friction balls shown in Figs. 5 and 6. Figs. 8, 9, 10, 11 and 12 represent views of modifications and details hereinafter referred to.

The same letters of reference indicate the same parts in all the figures.

In the drawings: *a* represents the hull of a dredging vessel, from one end of which projects a frame, composed of timbers or beams *b b* and braces *b' b'*, the beams *b b* being parallel with each other and constituting guides for a slide *c*, which is formed as a socket adapted to contain the spud-guide *e*. Said guide has a spherical outer surface, to which the interior of the socketed slide *c* conforms, so that the guide can turn freely in all directions in the slide, anti-friction balls or rollers *f* being interposed between the exterior of the guide and the interior of the socket. The guide *e* has a cylindrical vertical orifice through it, in which the spud *d* is adapted to move freely up and down. The socketed slide *c* is provided with means whereby it may be moved horizontally toward and from

the vessel *a*, said means, as here shown, being the screw-threaded shafts *h h*, engaged with threaded sockets in nuts or ears *c' c'* affixed to the slide *c*. The rotation of said screws causes the slide to move along the beams or guides *b b*, as will be readily seen. Said screws may be rotated by power imparted in any suitable way. I have here shown, as the power-imparting devices, a pulley *w'*, which may be driven by an engine or other motor on the vessel *a;* a pulley $w^2$, connected by a belt with the pulley *w';* bevel gears *m' m'* on the shaft $w^3$, to which the pulley $w^2$ is affixed; and vertical shafts *l l* having bevel gears $m^2$ $m^2$ meshing with the gears *m' m'*, and bevel gears *k k* meshing with similar gears *k' k'* on the screw-shafts *h h*. The spud is suspended from a wire rope or chain *u*, passing over a pulley *u'* on the swinging end of a frame or derrick *v*, which is pivoted at *v' v'*, said frame, as here shown, being composed of two timbers arranged in V-shape, with the pulley *u'* at the apex. The rope *u* is or may be wound on a drum on the vessel, and said drum may be provided with suitable means for locking or holding it against rotation when the spud is to be held stationary, and for permitting its rotation when the spud is to be raised and lowered.

The derrick frame may be raised and lowered by means of a rope or chain *t'*, affixed at one end to said frame and running over a pulley *t* on a fixed upright $t^3$, and a drum *x* (Fig. 2) on which said rope is wound. Said drum may be rotated by means of a worm-gear *r* on the shaft of the drum, a worm *q*, meshing with said gear and affixed to a shaft *p*, and bevel-gears *n' n²* connecting the shaft *p* with the shaft $w^3$ above-mentioned.

It will be seen that the frame projecting from the vessel *a* and the spud-guide on said frame outside of the vessel, prevent the possibility of injury to the vessel by the strain exerted on the spud by the motion of the vessel. It will also be seen that the ball-and-socket connection between the spud and the supporting-frame reduces to the minimum the strain exerted on the spud, the ball bearings between the parts or members of said joint enabling the vessel to roll with the minimum of friction and strain on the spud-guide. Said balls may be held in place in various ways. In Figs. 5, 6 and 7, I show the balls *f* held in rows in slotted elongated sockets on a spherical spider *g*, which is formed to occupy the space between the guide *e* and socket *c*, said spider being provided with vertically-arranged slots *g'*, as shown in Fig. 8, the right-hand portion of which represents a top view of the spider, while the left-hand portion represents a horizontal section on the plane of line 8—8, Fig. 7. Each of the said sockets is composed of two curved flanged slotted pieces F F (Figs. 9 and 10), formed to bear, one on the outer and the other on the inner surface of the spider *g*. The spider *g* is preferably made in halves, as shown in Figs. 5 and 6, said halves being provided with flanges $g^5$, which are connected rigidly by bolts $g^6$. In Fig. 11, I show the balls *f* secured to the spider *g* by independent circular sockets, each composed of two cup-shaped apertured pieces C C, formed to hold a ball between them, the spider having orifices for the balls.

The operation of the described mechanism is as follows: The vessel being in the desired position for dredging, the spud-guide *e* is adjusted to its innermost position, as shown by dotted lines in Fig. 1, and the spud is lowered until its lower end penetrates the bottom to the desired extent. The spud then serves as a pivot on which the vessel may swing until the material in the path of the dredger has been removed. The spud remaining in the position last described, the guide is moved outwardly from the vessel by the described adjusting mechanism, thus causing a forward movement of the vessel a distance equal to the adjustment of the spud-guide. The dredging operation is then resumed, and the vessel is swung on its pivot until the dredger has moved through its new path, and so on, the spud-guide being adjusted outwardly from time to time until the extreme of its outward movement has been reached.

In Figs. 3 and 4, I show movable supports *z z*, under the adjusting-screws *h h*, said supports bearing on the guides *b b* and having their upper surfaces in contact with the under sides of the adjusting-screws. There are two supports *z* for each screw, and they are at opposite sides of the nuts *c'*, and are connected by rods *z'* with each other, so that, when the nuts *c'* in moving outwardly strike the outer supports *z* and move them along, the rear supports will follow. When the nuts are moving inwardly, they strike and move the inner supports, the outer ones following.

I do not limit myself to the means here shown for adjusting the spud-guide and for raising and lowering the spud.

Various changes may be made in the details of construction, without departing from the spirit of the invention.

I claim—

1. A dredging machine, comprising a vessel, a spud-guide located outside of the vessel and having a ball-and-socket connection with the vessel, and a spud vertically movable in said guide, as set forth.

2. In a dredging machine, the combination of a vessel having a projecting frame whose side-bars form slide-ways, a spud-guide horizontally movable in said ways and carrying screw-threaded ears or fixed nuts, screw-shafts extending longitudinally of the frame and supported in bearings thereon, said shafts engaging the screw-threaded ears on the spud-guide, means for turning the said shafts and thereby moving the spud-guide longitudinally of its supporting-frame, and a spud carried on said guide.

3. In a dredging machine, the combination

of a vessel having an outwardly-projecting frame, a horizontally-movable socket on said frame, a spud-guide formed externally as a ball and located in said socket, and a spud vertically movable in said guide, as set forth.

4. In a dredging machine, the combination of a vessel having an outwardly-projecting frame, a horizontally-movable socket on said frame, a spud-guide formed externally as a ball and located in said socket, ball bearings interposed between the said socket and guide, and a spud vertically movable in said guide, as set forth.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 2d day of January, A. D. 1893.

GEORGE H. TITCOMB.

Witnesses:
C. F. BROWN,
A. D. HARRISON.