A. W. ROBINSON.

DREDGE.

APPLICATION FILED DEC. 12, 1917.

1,272,110.

Patented July 9, 1918.

2 SHEETS—SHEET 1.

Fig. 1.

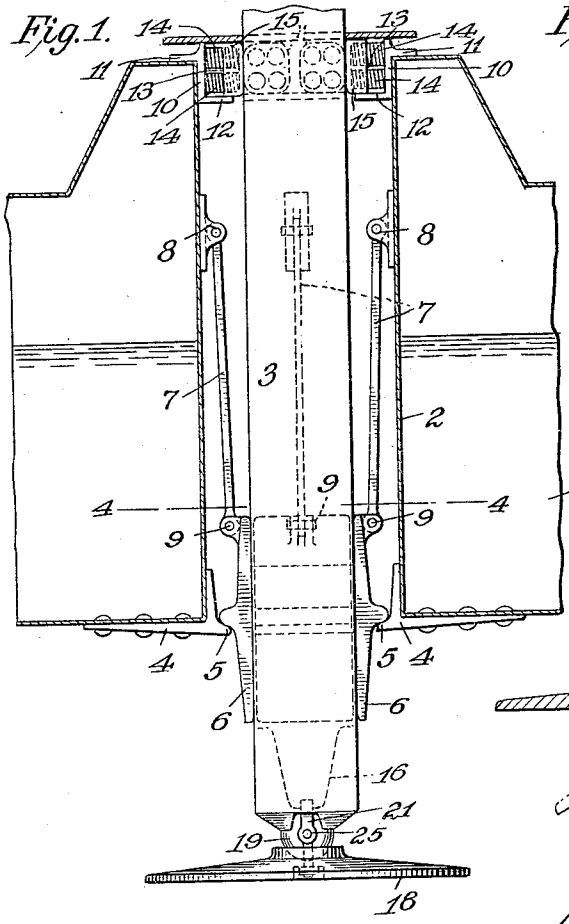


Fig. 2.

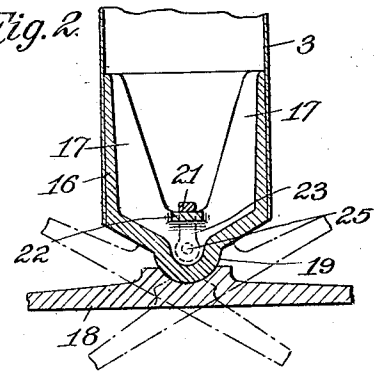


Fig. 3.

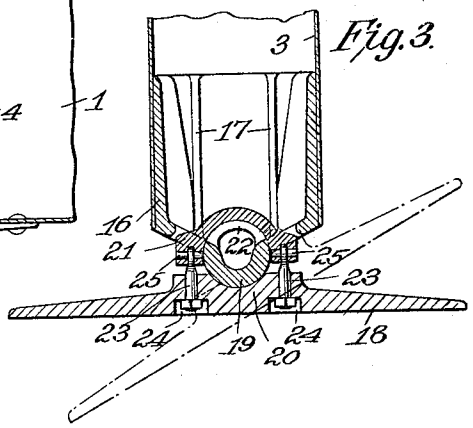


Fig. 4.

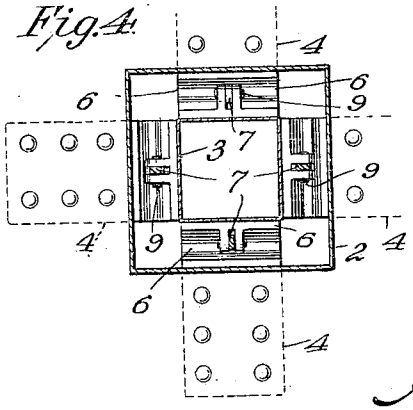
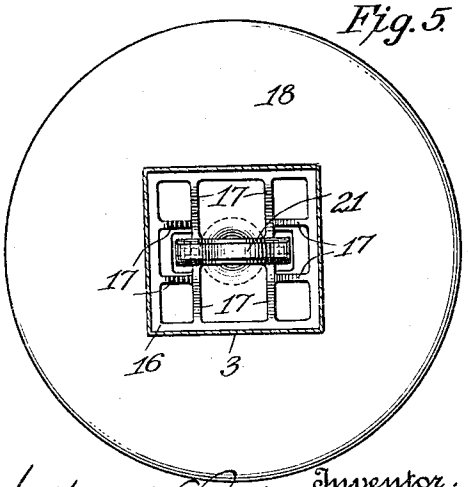


Fig. 5.



Inventor.

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By his Attorney

Phillips Abbott.

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2 SHEETS—SHEET 2.

Fig. 6.

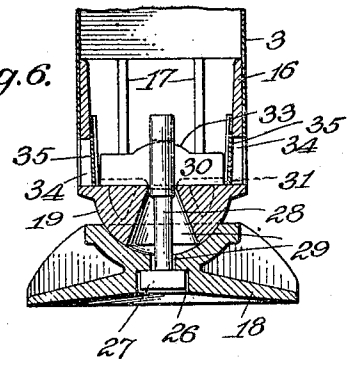


Fig. 7.

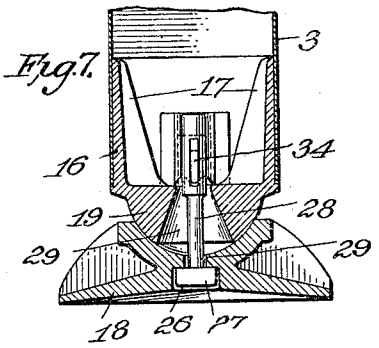


Fig. 8.

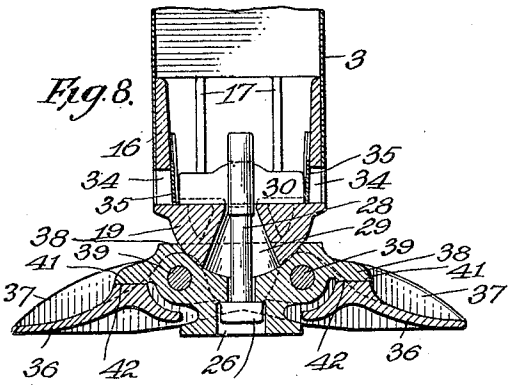
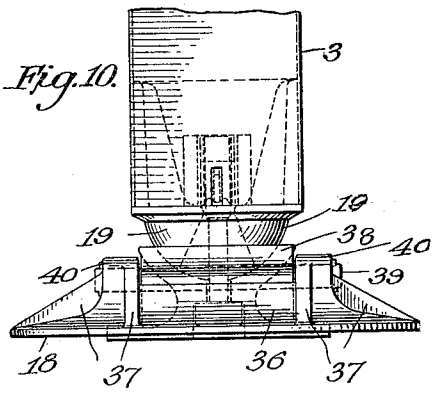


Fig. 10.



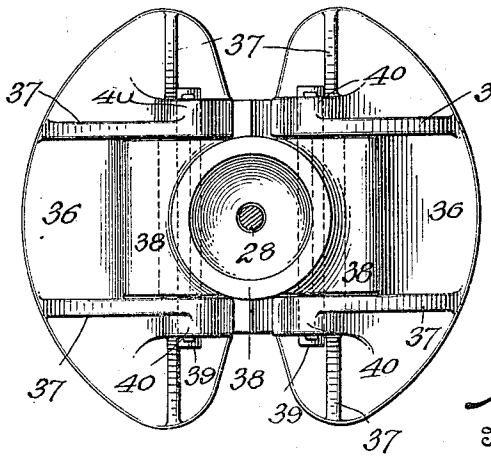


Fig. 9.

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UNITED STATES PATENT OFFICE.

ARTHUR W. ROBINSON, OF MONTREAL, QUEBEC, CANADA.

DREDGE.

1,272,110. Specification of Letters Patent. Patented July 9, 1918.

Application filed December 12, 1917. Serial No. 206,816.

To all whom it may concern:

Be it known that I, ARTHUR W. ROBINSON, a citizen of the Dominion of Canada, and a resident of the city of Montreal, county of Hochelaga, Province of Quebec, and Dominion of Canada, have invented a new and useful Improvement in Dredges, of which the following is a specification, reference being had to the accompanying drawings.

This invention relates to the manner of mounting or attaching spuds to the hulls or dredges and the object of the invention is to provide means for distributing the stresses both upon the spud itself and upon the supports therefor upon the hull in such manner as to more effectually resist them and prevent injury to either the spud or the hull, and also to provide elasticity or yielding quality between the spud and its supports, whereby crushing or breaking strains are prevented, or at least reduced.

The advantages of this invention will be more readily appreciated if the method of constructing and combining spuds with dredges as heretofore constructed be explained. The spuds have ordinarily consisted of a straight vertical member mounted in a slideway or casing having parallel sides which is rigidly attached to the hull or built into it as the case may be, in which the spud fits so loosely as to have free vertically sliding movement therein. The lower end of the spud rests on the bottom and serves to anchor the dredge and it also frequently sustains some of the weight of the bucket and its load. Spuds are therefore subjected at times to extreme lateral and compressive stresses which force them against the upper and lower ends or edges of the casing with great force, so that at these points of concentration a crushing and sometimes breaking strain is brought to bear upon the spud and upon the walls of the casing, so that if these parts be made of wood, they are frequently indented, distorted or broken, and if made of metal a shearing of the rivets or bolts and bending of the parts frequently occurs. Furthermore, there being no "give" or cushioning action against the surging due to operation of the dredge, there is a continual jarring and grinding effect while the dredge is in operation, which is more or less destructive and objectionable for other reasons.

By my improved construction these difficulties are obviated.

Referring to the drawings, Figure 1 is a vertical view, partly in section and partly in elevation, of a spud showing one method of its connection to and support by the hull; Fig. 2 is a vertical sectional view of the lower end of the spud, showing one means of attaching the adjustable foot plate thereto; Fig. 3 is a vertical sectional view of that which is shown in Fig. 2 taken at right angles thereto; Fig. 4 is a plan view of that which is shown in Fig. 1 taken on the line 4—4 of that figure; Fig. 5 is a plan view of that which is shown in Fig. 3; Fig. 6 is a vertical sectional view of a spud and its foot plate embodying the invention in such manner that the dredge may revolve about the spud; Fig. 7 is a vertical sectional view of that which is shown in Fig. 6; Fig. 8 is a vertical sectional view of a spud showing a collapsible foot plate; Fig. 9 is a plan view of that which is shown in Fig. 8; Fig. 10 is an elevation of that which is shown in Figs. 8 and 9 taken at right angles to Fig. 8.

In the drawings, referring first to Figs. 1 to 5, both inclusive, 1 represents the hull of the dredge, 2 the spud casing built into the hull, 3 the spud, which in the case illustrated is square in shape, and 4 heavy metallic bearing plates bolted to the hull at the lower end of the spud casing. The bolts are strong and many in number, as shown, so as to rigidly hold these bearing plates in position. As shown there are four of these plates, one at each side of the casing. They are provided at or near their lower edge with an inwardly extending flange 5. 6 are bearing plates supported upon links 7, which in turn are pivoted at their upper ends to brackets 8 suitably supported upon the side of the casing. The bearing plates 6 are pivoted at 9 to the links 7 and have projecting parts near their centers, as shown, which engage with the flanges 5 of the bearing plates 4, as shown. 10 is a metal frame, in this instance square in shape, which is provided with outwardly extending flanges 11 at its upper part which rest upon the deck of the dredge adjoining the open mouth of the spud casing and with inwardly projecting flanges 12 at its lower part, and within the box or shelf-like support thus afforded,

there are a series of resilient bearing plates 13 supported upon coiled springs 14, which preferably are arranged in sets or groups resembling the arrangement of similar springs in railway car construction and each of these sets of springs is inclosed within a flanged bearing plate or box-like structure 15, the inner flat surface of which takes a bearing against the spud. The lower end of the spud is provided with a ball and socket construction as follows: 16 is a casting strengthened by suitable ribs 17. 18 is the bearing or foot plate for the spud. The casting 16 at its lower end is provided with a ball-like extremity 19, which engages in a correspondingly shaped socket 20 in the plate 18. 21 is a strap the lower surface of which is struck on the arc of a circle concentric with the ball 19 and it passes over and rests upon a seat or bridge 22, see Figs. 2 and 3, made in the casting 16 and is pivotally connected thereto by bolts 23, 23, which are headed in recesses 24, 24, made in the foot plate and are pivoted to the strap by pivots or pins 25, 25, see Figs. 2 and 3. The foot plate will be made of such dimension and construction as desired to correspond with the character of the bottom at the place where the dredge is at work and each spud may be provided with foot plates of different size and construction. It will be noted that the foot plate thus far described is automatically adjustable, that is to say, if the bottom be level and soft, it will attain substantially a horizontal position. If, on the contrary, the bottom is hard or rocky, so that a spud which had no foot plate might be apt to become jammed in the crevices of a rock or the like, then a foot plate of such size as desired may be used which will span across crevices within which the end of the foot plate might become jammed or lodge and will automatically adjust itself to unevennesses on the bottom, since the ball and socket construction and the method of pivoting the foot plate to the spud affords rocking or tilting movement in all directions; and it will be particularly noted that during the surging of the dredge, owing to its movement resulting from the action of the dipper or equivalent excavator or because of current or wave action, the strains both upon the spud and upon its casing on the hull are all avoided, because whatever the depth of water may be and in whatever direction the strains may come, they will be received at the lower end of the spud casing upon the extended contact surfaces of the bearing plates 6, 6, and distributed over large areas of the spud, so that no injury will come to it and the strains applied at this point will be transmitted through the pivotally suspended bearing plates to the plates 4, 4, rigidly fastened to the hull of the dredge at or near the bottom thereof where the construction is strong and firm. Thus no injury can occur either to the spud, the casing or to the hull itself; and similarly at the upper end of the casing where injury to the spud and to its casing are apt to occur, as they have heretofore been made, injury is now entirely avoided because such stresses as occur there will be received upon the bearing plate 15, 15, and nullified by means of the groups or sets of springs 14, so that no injury either to the spud or to the casing will result at this point. I prefer to make the flanged frame 10 at the upper end of the casing in such manner that the bolts which confine it to the deck may be readily loosened and the frame and the contained groups of springs and the box-like bearing plates 15, which confine them, may be lifted bodily off from the casing, in which event the pins 8, 8, being removed from the brackets which support the links 7, they and the bearing plates 6 can all be lifted out upon the deck of the dredge should repair become necessary.

The above description and the drawings Figs. 1 to 5 illustrate a form of my invention which will be found useful in many cases, but in others the conditions are such that it may be convenient or necessary to swivel or rotate the dredge upon its spud or upon one of the spuds, if more than one be used. In such cases the connection between the spud and the foot plate should be one affording complete rotary movement of one relative to the other, and in the construction above described this would not be possible because although it permits considerable oscillatory movement of the dredge and the spud carried by it relative to the foot plate, complete rotation will not be possible without fracture of the strap 21 and probably adjoining parts. To provide, therefore, such rotary movement, I equip the bottom of the spud and the foot plate in the manner shown in Figs. 6 and 7, in which the foot plate 18 is provided with a recess 26, within which the head 27 of a bolt 28 rests, which passes somewhat loosely upwardly through a hole made in the foot plate as shown and the ball casting 19 of the lower end of the spud is provided with a conical vertical opening 29, up through which the bolt 28 passes and the bolt at its upper end is provided with a transverse key 30, which passes through a slot made in the upper end of the bolt. The lower edge of this key at 31, 31, is transversely rounded on its lower edge, so that it is adapted to rocking movement to the right or left and at the central portion of the key 30, there is an upwardly extending portion 33 formed on the arc of a circle struck from the center of the ball, so that universal movement of the foot plate 18 relative to the casting on the lower end of the spud is permitted in

all directions. The key may be readily inserted and removed through openings 34 made in the side of the spud or in the casting at its lower end and the key may be retained in place by stop plates 35 or in any other desired manner.

The operation of this form of my invention does not require further description than that already given.

It sometimes happens that the character of the bottom is such that the foot plate will bury itself quite deeply in the mud or silt and that the suction will be so great that it is difficult to lift the spud. In order to adapt my invention to use under such circumstances I make a further modification of the foot plate, *i. e.*, I construct it as shown in Figs. 8, 9 and 10, which illustrate the plate proper, as made in two hinged or pivoted halves, so that when moved downwardly, they will open out and become practically a flat plate, but when drawn upwardly the two halves will close together upon their pivots and thus collapsing will break any suction which may exist and permit the spud with its foot plate to be easily lifted. In the form shown in said Figs. 8, 9 and 10, such a collapsing foot is shown. It is made in two equal parts 36, 36, each of which is stiffened by the usual flanges or webs 37. The foot plate casting 38 is provided with a pair of strong hinge pins 39, which pass through suitable bearings on the casing and each of the halves 36 of the collapsible foot plate is provided with upwardly extending portions 40, see Fig. 10, through which the hinge pins 39 pass, so that they are pivotally connected to the central foot casting. I prefer to provide the collapsible foot plate sections and the central foot plate casting with suitable abutting surfaces, such as 41, 42, see Fig. 8, which should preferably be substantially central over the line of pressure on each plate, so that little if any strain will come upon the hinge pins practically the only function of which is to retain the collapsible foot plate sections in place and lift them from the bottom when the spud is raised. The operation of my invention with this modified form of foot plate is also so readily understood from the foregoing description that extended explanation is not necessary.

It will be obvious to those who are familiar with such matters that the above described and illustrated constructions are examples merely of various forms in which my invention may be embodied, and that all forms are based upon the same generic and underlying invention, the details of which will, however, be varied to suit the requirements of the special job upon which the dredge may from time to time be engaged. I therefore do not limit myself to either of the constructions or to the details in any respect of the parts described and illustrated. They may be, as stated above, extensively departed from and yet the essentials of the invention be employed. I wish to specify as follows: It is not essential that the bearing plates 6 and the cushioning springs 14 shall be arranged, constructed and supported as I have shown them. Any other suitable construction may be employed. Nor need they respectively be at the extreme lower or extreme upper end of the spud casing. My invention will be employed provided they be so located as to effect the reduction of the injurious stresses referred to. Also if the spud be round or of any other form than square, then obviously the bearing plates 6 and the cushioning springs 14 will be shaped and of such number as best adapted to fulfil their respective functions; also that the foot plate and the method of connecting it with the lower end of the spud may be different from either of the forms shown by me without departing from the essentials of my invention. The forms which I illustrate and describe are useful and practical, but there are many other constructions, the details of which one skilled in such matters will at once understand, which may be employed.

I claim:

1. A dredge having a spud casing and guiding and cushioning devices for the spud at or near the top of the casing.

2. A dredge having a spud casing and adjustable bearing plates adapted to engage with the spud at or near the lower end of the casing and cushioning and guiding devices for the spud at or near the upper end of the casing.

3. A spud and a base plate therefor, a ball and socket joint formed upon their respective contacting surfaces, one of said members being provided with a vertical opening having two diameters and the other with a vertical conical opening, a headed bolt the head whereof is held within the part of said vertical opening which has the greater diameter and the shank whereof passes through the part of said opening which has the smaller diameter and also through said conical opening, and a key having a curved surface which engages with the bolt whereby oscillatory movement of the ball and socket joint in two directions is afforded.

4. A spud having a conically recessed ball casting on its lower end, a base plate having a corresponding ball socket in its upper surface, a headed bolt engaging with the base plate and passing through the conical recess in the ball casting, and a key which passes through the bolt whereby the base plate is held to the casting.

5. A spud having a conically recessed ball casting at its lower end, a foot plate

comprising a central casting having a ball socket in its upper surface and a recess in its lower surface, two substantially equal wings or plates pivoted to the central casting in such manner as to expand when pressed against the bottom and to collapse when lifted from the bottom, the socket casting being pivotally connected to the ball casting by a vertically arranged headed bolt which passes through the conical recess in the ball casting.

In testimony whereof I have signed my name to this specification.

ARTHUR W. ROBINSON.