L. LARSEN.

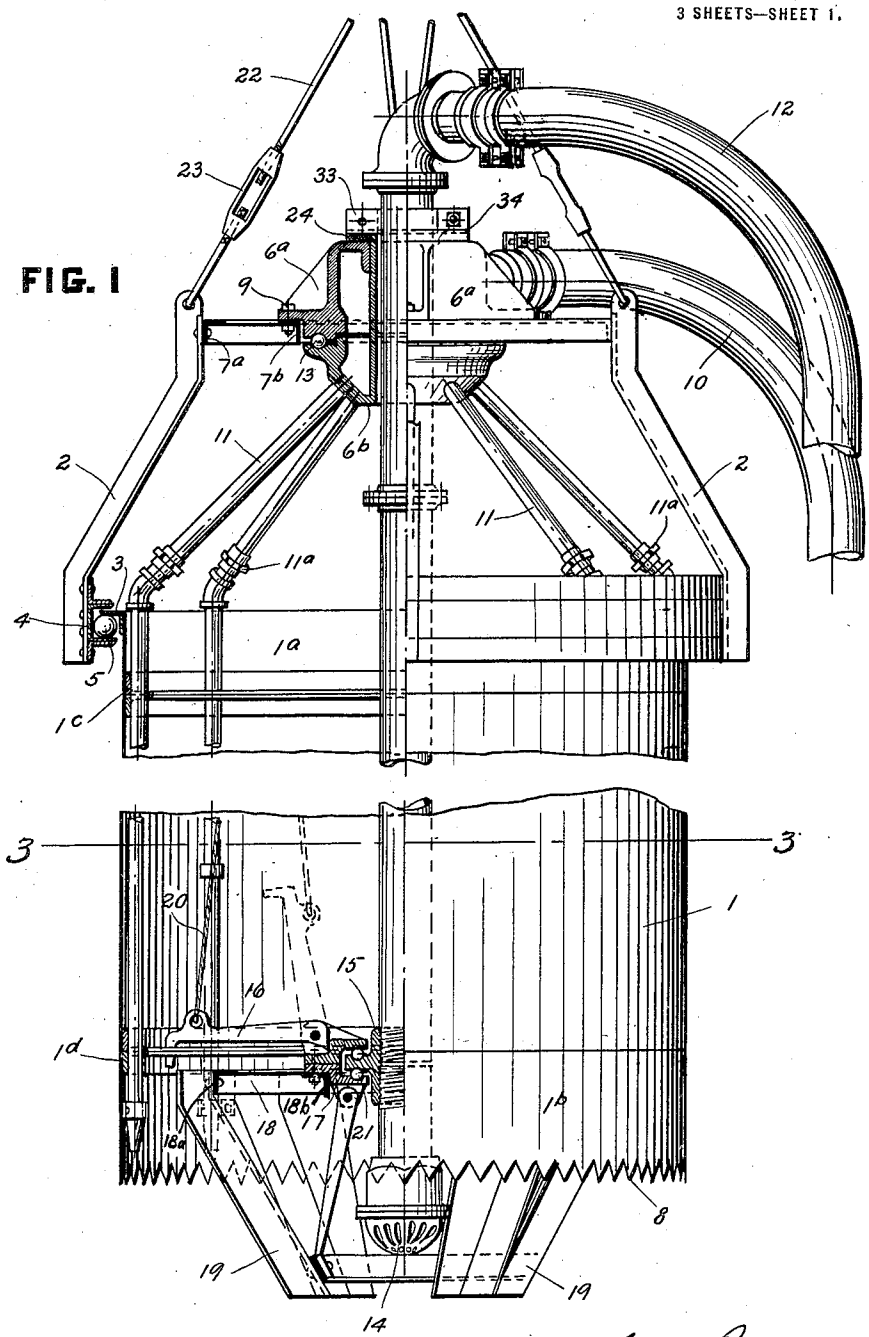
EXCAVATING MACHINE OF THE ROTARY TYPE.

APPLICATION FILED JUNE 1, 1920.

1,428,788. Patented Sept. 12, 1922.

3 SHEETS—SHEET 1.

FIG. 1



WITNESSES:

INVENTOR:

L. LARSEN.

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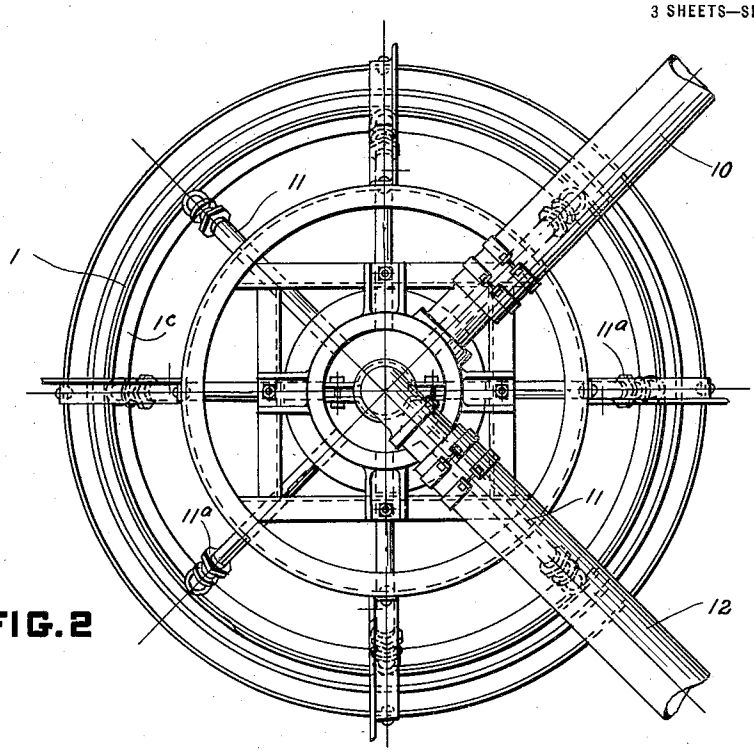


FIG. 2

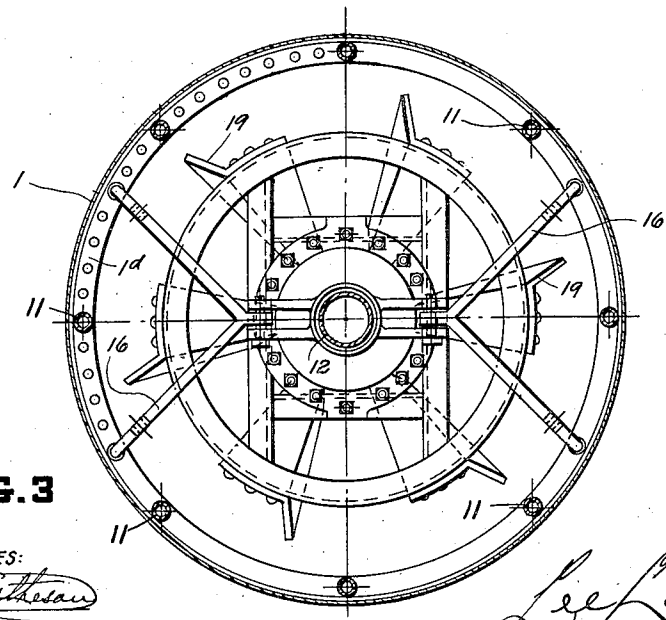


FIG. 3

WITNESSES:

INVENTOR:

L. LARSEN.

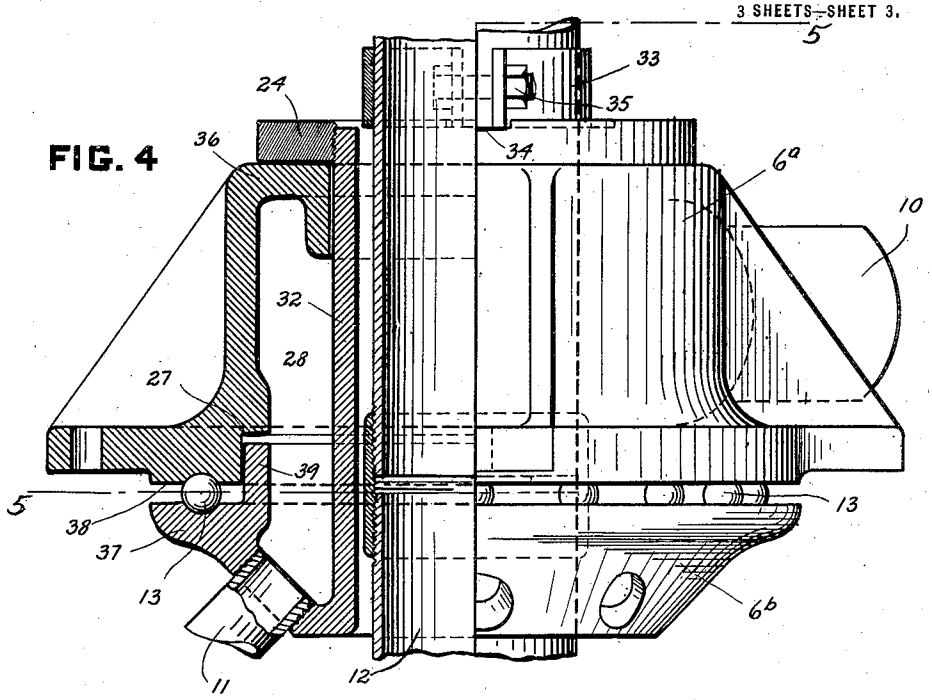
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3 SHEETS—SHEET 3.

FIG. 4



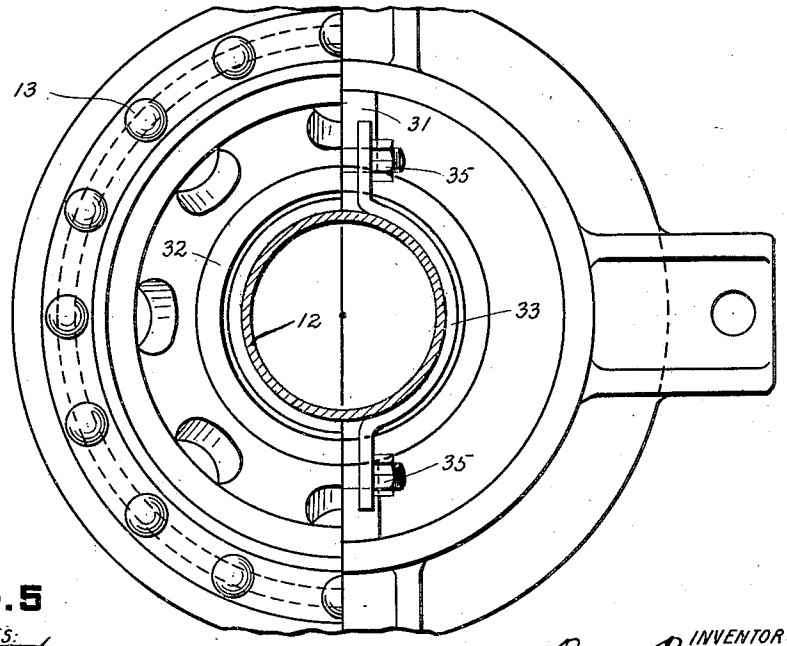


FIG. 5

WITNESSES:

INVENTOR:

Patented Sept. 12, 1922. 1,428,788

UNITED STATES PATENT OFFICE.

LEE LARSEN, OF TAMPICO, MEXICO.

EXCAVATING MACHINE OF THE ROTARY TYPE.

Application filed June 1, 1920. Serial No. 385,848.

To all whom it may concern:

Be it known that I, LEE LARSEN, a citizen of the United States of America, residing at Tampico, in the State of Tamaulipas, Republic of Mexico, have invented certain new and useful Improvements in Excavating Machines of the Rotary Type, of which the following is a specification.

My invention relates to excavating machines of the rotary type used in construction of reinforced concrete columns or piers, which shall serve as supports for bridges, wharves, bulk-heads, light-houses, etc. in order to secure foundations for the same.

The objects of my invention are to produce a combined apparatus which includes means for excavation and removing the excavated material while the apparatus penetrates the strata gradually, and at the same time to provide a casing or coffer dam of any desired length or diameter, built up gradually in sections, inside which casing the concrete work can be placed in a convenient manner without difficulties, and which casing after the work has been performed can be removed to be used at other work.

My invention includes means whereby it is possible to twist down cylinders by water pressure and jetting or dredging, and at the same time to remove the excavated material by suction; means are also provided for a quick and easy dismantling and removing of the apparatus.

Especially where difficult conditions for foundations are met with, it is possible by this combined excavating and suction machine to work down through any strata of the soil, and by its simple construction the whole apparatus is easy to handle and will in practice save considerable time and expense.

A preferred design for the various means of effecting these objects is shown in the accompanying drawings, wherein:

Figure 1 shows, partly in section, the combined apparatus and piping system employed for excavating the ground.

Figure 2 is a top view and

Figure 3 a sectional plan view of the apparatus, on line 3—3 of Fig. 1.

Figure 4 represents a detail of the ball bearing swivel for water and suction pipes, and

Figure 5 is a plan view of the same, being a transverse section on line 5—5 of Fig. 4.

With reference to Figs. 1 to 3 of the drawings, these figures show the instruments employed to dredge the way down for the columns or piers etc. to be constructed. 1 is a cylinder or tube of strong construction, conveniently made up of one top and one bottom piece or section, 1^a and 1^b, to which sections of steel tubes or cylinders of a suitable length gradually are connected, and on the inner side of same bolted up and joined together by angle iron rings, 1^c and 1^d, or other means convenient for the purpose. To the edge of the top piece 1^a of the cylinder 1 is riveted an angle iron ring 3 which when connected up rests on balls 5 and turns freely in a channel ring 4 formed by angle irons connected to the lower part of hanger-arms 2. By means of a frame made of two angle iron rings, 7^a and 7^b, fastened to the upper part of arms 2 is connected the top piece 6^a of the combined ball bearing swivel box intended for the piping system. To this swivel which is shown in details in Figs. 4 and 5 and forms an essential part of my invention, is connected the hose 10 for water, which is pressed down and forced through the box into jet pipes 11. These pipes are made up of short pieces according to the length required, and connected up to the bottom casting or body 6^b of said swivel, going down through holes in flanges or rings 1^c, 1^d, within a few inches of the bottom of the cylinder, and so connected that they can turn round together with the cylinder. These jet pipes can be gradually extended according to the progress of the work by adding more pieces connected together by unions 11^a, and are reduced at the ends to give the water more pressure. In the center of the swivel box is located the suction pipe 12 for sucking out the excavated material, serving at the same time as pivot or shafting on which the bottom body 6^b of the swivel box with jet pipes 11 can freely turn on balls 13. The suction pipe 12 is held up by clamps 33 which are set in a slot 34 in ring 24 and can be tightened together by bolts 35 (see Fig. 4) thus resting in said ring to prevent the suction pipe 12 from turning round. The bottom end of this pipe is provided with a strainer 14 to allow only a convenient size of material to enter the suction pipe, in order not to stop the passage of the material to be dredged out. On the lower part of the suction pipe 12 is screwed a T-shaped ring 15 which forms a bearing

for a rotatable ring made up of two Z-shaped irons or castings 17, which carry the knives or cutters 19 for loosening the material to be excavated. These knives or cutters are fastened to a frame 18 made up of angle irons 18^a and 18^b and provided with hinged double hooks 16 which can be connected to the cylinder 1 in the flanges or angle irons 1^d as shown in Fig. 3, so that they easily can be pulled out with the whole machinery by loosening the hooks with the wire cables or manila ropes 20 when the cylinder or casing 1 is down to its place, to leave the cylinder entirely clear to receive the concrete construction. In order to run easily and with a convenient speed, bearing 15 is supplied with balls 21 for this purpose, and it is well understood that the suction pipe 12 and also the cutting machine 19 can be lowered down and easily adjusted according to the progress of the excavation work by adding more sections to suction pipe 12 in the same way as the cylinder sections.

The bottom section 1^b of cylinder 1 which preferably is made of tempered steel, is at the edge provided with teeth 8 like a cross cut saw, which will help to cut and loosen hard material encountered.

The hangers 2 can be placed in any suitable head-frame or framework by means of steel cables 22 or the like, which can be adjusted by tightening or loosening the turn buckles 23 in order to always keep the cylinder in proper balance so not to run out of plumb and not to leave the cylinder or cutting machinery resting too hard on the ground to prevent hard strain on the rotary.

With reference to Figs. 4 and 5 which show the combined ball bearing swivel box, this box consists of two parts, 6^a and 6^b, of which body 6^a is connected to the angle iron frame 7^b (Fig. 1) which is fixed to hangers 2. Body 6^b rests on flange 36 of the upper body of the box by means of a ring 24 which is screwed to the upper edge of the inside division 32 of body 6^b, entering the recess 27 thus forming a canal or passage 28 through which the water from the water hose 10 passes to be conducted to the jet pipes 11 to help loosen the material to be removed by suction through pipe 12. The box body 6^b is provided with a flange 37 which serves as cup for the balls 13 and is pressed lightly up against the flange 38 of the upper body 6^a, so that the lower box can turn easily on the balls 13 placed between their surfaces, the flange or gland 39 entering the recess 27 so that it forms a tight whole.

After the apparatus has been connected up so that cylinder 1 and the lower body 6^b of the combination ball bearing swivel with jet pipes 11 as well as the castings 17 with the knives or cutters 19 can turn freely, while the hanging mechanism 2 with the upper body 6^a of the swivel to which suction pipe 12 is fixed by means of clamps 33, the cylinder 1 of convenient length is placed in the rotary table (not shown) and the hangers adjusted to its proper height, and then the water is turned on through water hose 10 pressing the water through the swivel box into the jet pipes 11. The cutting machine 19 will now work its way down loosening the material to be excavated and at the same time give way for the cylinder 1 turned by the rotary, the saw like edge 8 on the bottom section will also help in loosening any class of obstructing material to be excavated, by being supplied with sufficient water from the jetting system. The material thus loosened will at the same time be removed by suction through the suction pipe 12. Gradually, according to the progress of the work, sections of tubes are added to the cylinder 1 and pieces connected by unions 11^a to the jet pipes 11, which easily can be accomplished by taking the apparatus apart while putting in new sections. When the cylinder has reached the depth from which the columns or piers shall be constructed the mechanism with the cutting machine 19 is disconnected and removed by lifting the hooks 16 out of their seat by means of the cables or ropes 20, and the construction of the columns or piers can now be proceeded with. After placing the respective molds or forms for the columns or piers, the cylinder or casing 1 (which cutting edge 8 conveniently is kept in a level above the concrete of the foundation for the columns or piers) can be removed to be used on other jobs, thus saving the expense of new cylinders for each column.

It is unnecessary to mention all the great advantages the employment of this apparatus by its simple construction will offer to any operating work where this combination can be used, and by small changes in the details of the construction of the apparatus, which I reserve as covered in the scope of my invention, it can be fitted to serve almost any work where the columns or piers are built up from the foundation.

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

1. An excavating machine of the type described, comprising a cylinder provided with means for dredging its way down into the ground, rotatably connected to means which support said excavating machine, said cylinder being gradually extended by sections to the desired height of the column to be constructed, to form a casing inside which said column can be built up; a combined swivel box support, said support having passageway for water supply; a water supply piping system for loosening the material to be excavated; a suction pipe line for conveying the excavated material, said water and suc-

tion systems being combined with said swivel box support; a suction pipe provided with means to separate the excavated material, said suction pipe at the same time serves as bearing and pivot on which said cylinder can turn; a rotatable cutting apparatus connected up to said cylinder and suction pipe with freedom of turning around together with said cylinder on said suction pipe.

2. An excavating machine of the type described, as set forth in claim 1, in which the water supply for loosening the material to be excavated is introduced into the jetting pipe system through a passageway formed in a combined swivel box, said swivel box being formed by two bodies of which the upper body forms a part of the support for said excavating machine and fixed to hangers for said apparatus, the other lower body carrying said jetting pipe system can turn freely around the suction pipe which serves at the same time as pivot for the excavating apparatus.

3. In an excavating machine of the type described, as set forth in claim 1, a suction pipe through which the excavated material can be conveyed, said suction pipe at the same time serves as pivot for the combined apparatus; a cutting machine; and means for carrying and adjusting of said excavating apparatus.

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

LEE LARSEN.

Witnesses:
F. MATHESON,
MIGUEL SELKOWITZ, C.