June 2, 1925. 1,540,681

E. DÉTAINT

APPARATUS FOR RAISING LIQUIDS

Filed Aug. 14, 1923 2 Sheets-Sheet 1

Fig.1

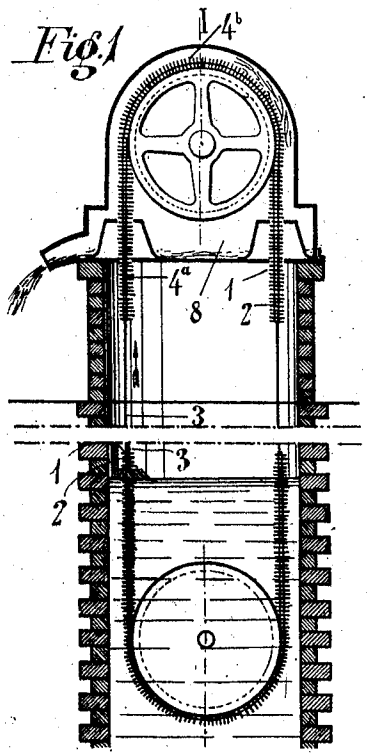


Fig.2

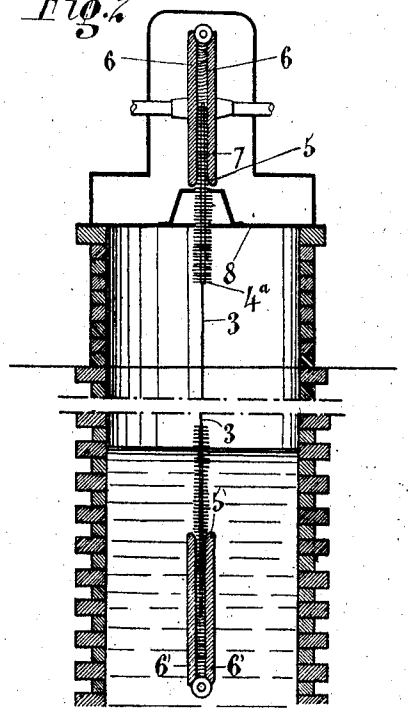


Fig.3

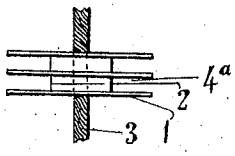


Fig.4

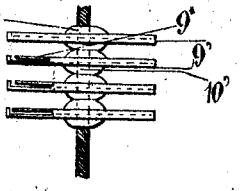


Fig.6

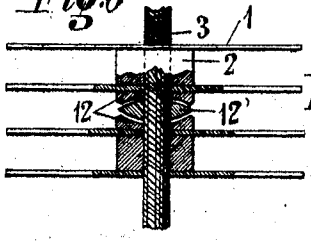


Fig.5

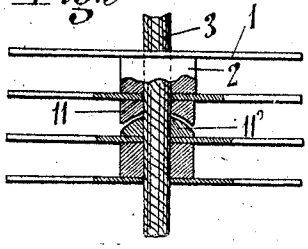
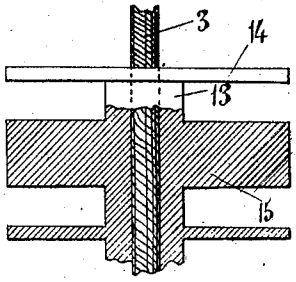


Fig.8



Inventor
E. Detaint
Atty

June 2, 1925. 1,540,681

E. DÉTAINT

APPARATUS FOR RAISING LIQUIDS

Filed Aug. 14, 1923 2 Sheets-Sheet 2

Fig.7

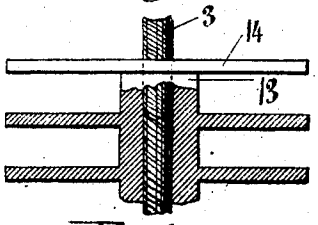


Fig.11

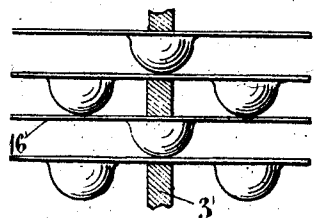


Fig.9

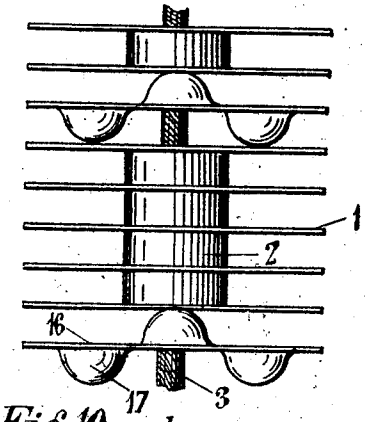


Fig.12

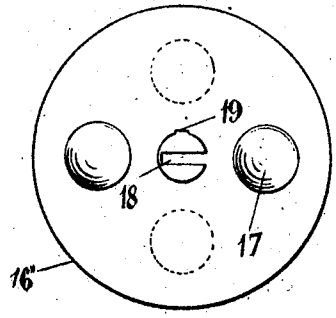


Fig.10

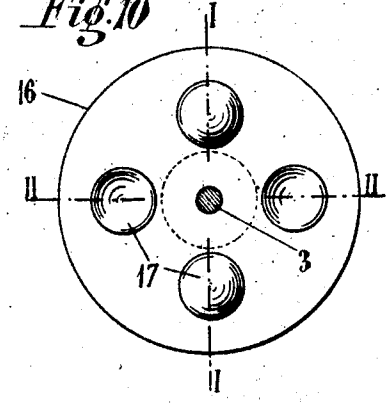


Fig.12'

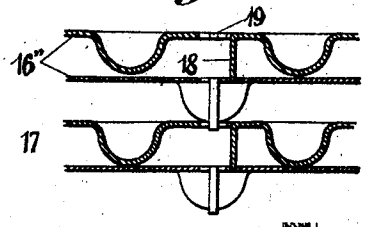


Fig.13

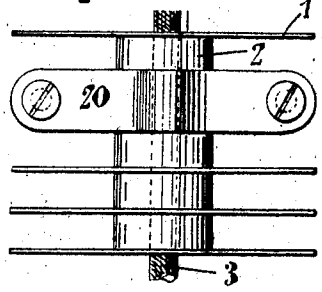
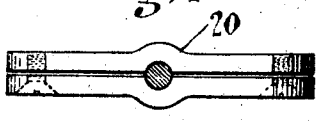


Fig.14



Inventor
E. Detaint
Atty

Patented June 2, 1925. 1,540,681

UNITED STATES PATENT OFFICE.

EDMOND DÉTAINT, OF PARIS, FRANCE.

APPARATUS FOR RAISING LIQUIDS.

Application filed August 14, 1923. Serial No. 657,406.

To all whom it may concern:

Be it known, that I, EDMOND DÉTAINT, engineer, 19 Passage du Montenegro, Paris, citizen of the French Republic, residing at Paris, 19 Passage du Montenegro, have invented new and useful Improvements in Apparatus for Raising Liquids, of which the following is a specification.

This invention relates to an apparatus for raising liquids formed with an endless cable upon which are strung a number of thin discs alternating with other discs of smaller diameter, such discs being made of any suitable material. The whole is pulled up by a grooved pulley without any middle part. While passing through the liquid, the intervals comprised between the discs are filled with liquid which is held back by the superficial tension due to a suitable ratio between the surface of the large discs and the distance which separates them. The liquid raised as far up as the grooved pulley is poured out in the centre by gravity or centrifugal force according to the speed, owing to the vertical position assumed at this moment by the discs between which it was held up to that time.

The accompanying drawings show diagrammatically and by way of example modes of carrying the invention into practical effect.

Fig. 1 is a view in vertical section showing the improved liquid elevating device in operative position.

Fig. 2 is a similar view taken at right angles to the showing in Fig. 1.

Fig. 3 is a broken elevation showing a plurality of discs arranged on the cable.

Fig. 4 is a similar view with a modified arrangement of discs and disc spacing means.

Fig. 5 is a similar view with a modified arrangement of the disc spacing means.

Fig. 6 is a similar view with a further modified form of disc spacing means.

Fig. 7 is a view in elevation, partly in section showing integral and inherently resilient discs.

Fig. 8 is a view similar to Fig. 7, showing a modified form of such discs.

Fig. 9 is a view in elevation showing a plurality of discs arranged on the cable with certain of the discs provided with supporting means to permit a certain amount of flexibility between the sets of discs lengthwise the cable.

Fig. 10 is a plan view of one of the particularly formed spacing discs shown in Fig. 9.

Fig. 11 is a view showing a modified arrangement of discs with a particular form of cable.

Fig. 12 is a plan view of one of the discs shown in Fig. 11.

Fig. 12′ is a vertical sectional view through the discs as indicated in Fig. 11.

Fig. 13 is a view in elevation of the preferred form of discs combined with limiting stops for supporting the weight of the discs above such stops.

Fig. 14 is a plan view of one of the stops, the cable being shown in section.

The thin discs 1 alternating with thicker discs 2 having a smaller diameter are alternately strung on an endless cable 3. The thickness of the discs is calculated relatively to the diameter of the thin discs 1, so that the superficial tension of the liquid filling the intervals between the successive discs should be sufficient to prevent the flow of the liquid while it is being raised. The cable with the discs is arranged in the groove 5 of a pulley formed of two parts 6—6 between which an empty space 7 is left below this space is placed a receiver or tank 8 formed by the framework supporting the pulley 6—6.

When the discs become vertical the water flows into the tank 8 through the space 7.

On the passage of the discs 1 over the pulley 6—6, the flexion of the cable causes the lower edges of the discs to get nearer together and while these discs rock on the lower edges of the corresponding small discs they slide over the bent part of the cable which they may thus wear out in time. This sliding motion is avoided either by providing small india rubber discs which yield as they pass over the pulley, or in the manner shown in Fig. 4 where each disc 1 is replaced by a pair of discs 9—9^1 placed against one another, one of these discs 9^1 has an outer edge wherein the thickness of the other is located in such a manner that the discs remain concentric; each disc has its central part forced outwardly so as to form shells 10—10^1 keeping at a suitable distance the disc pairs 9—9^1. When the lower edges of a pair of discs come nearer to the adjoining pair while passing over the pulley 6—6, the shells 10—10^1 of the two discs under consideration roll one over the other with-

out the pair of discs sliding along the cable. The bend of the cable on its passage over the pulley occurs inside the shells.

In the construction shown in Figs. 3 to 14, the shifting of the discs on the cable as it passes over the pulley is avoided by making use of india rubber discs or wings which are either independent or formed integrally with a tube of similar material within which the endless cable passes, or if necessary a certain number of small discs 2 can be replaced by ball jointed discs the number of which may vary according to the size of the apparatus and to its use.

The ball jointed discs may be formed of two pieces 11—11¹ (Fig. 5) or of a concave and convex part or of three pieces 12—12¹ (Fig. 6) the two pieces or parts being concave and the piece 12¹ being convex.

These ball jointed pieces allow for the flexion of the whole concern without any pushing occurring against the cable fastener.

In Figs. 7 and 8 the apparatus is composed of a tube 13 of india rubber or other similar material provided with wings 14. A metallic cable 3 passes inside this tube 13 to allow the apparatus to withstand traction.

For shafts or pits of great depth or for raising apparatus of large diameter, thicker wings 15 than the ordinary wings 14 are provided from place to place. On their passing over the upper pulley these wings 15 carry the weight of the liquid raising apparatus and thus prevent deformation by crushing of the wings 14.

In Figs. 9 and 10 metallic discs 16 are arranged from place to place between each two successive thin discs 1 and have the same diameter as the latter, such discs being provided with four solid bosses or hollow shells 17—17 fitted at the ends of two perpendicular diameters 1—1, 11—11, two bosses or shells being placed on the same diameter project upon one of the faces of the disc 16, and the two other bosses or shells project upon the opposite face. These discs 16 the distance between each vary according to the amount of flexion required for the cable form a Cardan or universal joint the axes of whose pivots are perpendicular one to the other and placed in a plane which is perpendicular to the axis of the cable.

In the arrangement shown in Fig. 11, the flexible cable 3 has a square cross section and all the discs 16 are centrally perforated and have two solid bosses projecting upon the same disc face. These perforations have a square shape and the successive discs bear one upon the other with their bosses or shells, the axes on which two following discs pivot are perpendicular one to the other.

Discs with two bosses may likewise be mounted upon a flexible cable having a circular cross section; it is sufficient for such a purpose to cut out of the central holes of the discs 16 as they are being made a small tongue 18 and a notch 19 (Figs. 12 and 12¹). The individual rotation of such disc about the cable is prevented by the insertion in the notch 19 of a disc of the adjoining tongue piece 18 raised for this purpose parallelly to the cable axis. Stoppage straps 20 (Figs. 13 and 14) tightened upon the flexible cable apportioning over several points of the latter the weight of the disc and that of the raised liquid may also be provided.

I claim:

1. An apparatus for raising liquids, including a cable, and discs arranged in superimposed relation thereon, said discs including comparatively thin discs spaced apart by thicker discs of materially less diameter, the relative diameters and thicknesses of the respective discs being such as to produce a superficial tension to retain liquid between successive thin discs.

2. An apparatus for raising liquids, including a cable, and discs arranged in superimposed relation thereon, said discs including comparatively thin discs spaced apart by thicker discs of materially less diameter, the relative diameters and thicknesses of the respective discs being such as to produce a superficial tension to retain liquid between successive thin discs, and a pulley over which said cable is adapted to pass to permit the discharge of water from between the discs as said discs approach a vertical plane.

3. An apparatus for raising liquids, comprising an endless cable, thin discs arranged thereon and thicker discs of less diameter than the thin discs interposed between said thin discs, said thicker discs being arranged to permit a movement of the cable to arrange the discs in discharge relation without permitting relative movement of said discs on said cable.

4. An apparatus for raising liquids, comprising an endless cable, liquid retaining discs arranged thereon, said discs being of similar diameter but different thickness, and interposed disc members between said discs, said interposed members being of greater thickness and of less diameter than the first mentioned discs.

5. An apparatus for raising liquids, including an element and a series of spaced discs arranged transverse the element, the relative spacing of the discs producing a superficial tension to retain liquid between the discs.

In testimony whereof I affix my signature.

EDMOND DÉTAINT.

Witnesses:
H. BOETTCHER,
C. BATERN.