No. 674,017. Patented May 14, 1901.

H. RIENSCH.

APPARATUS FOR PURIFYING DIRTY WATER.

(Application filed Aug. 14, 1899.)

(No Model.) 4 Sheets—Sheet 1.

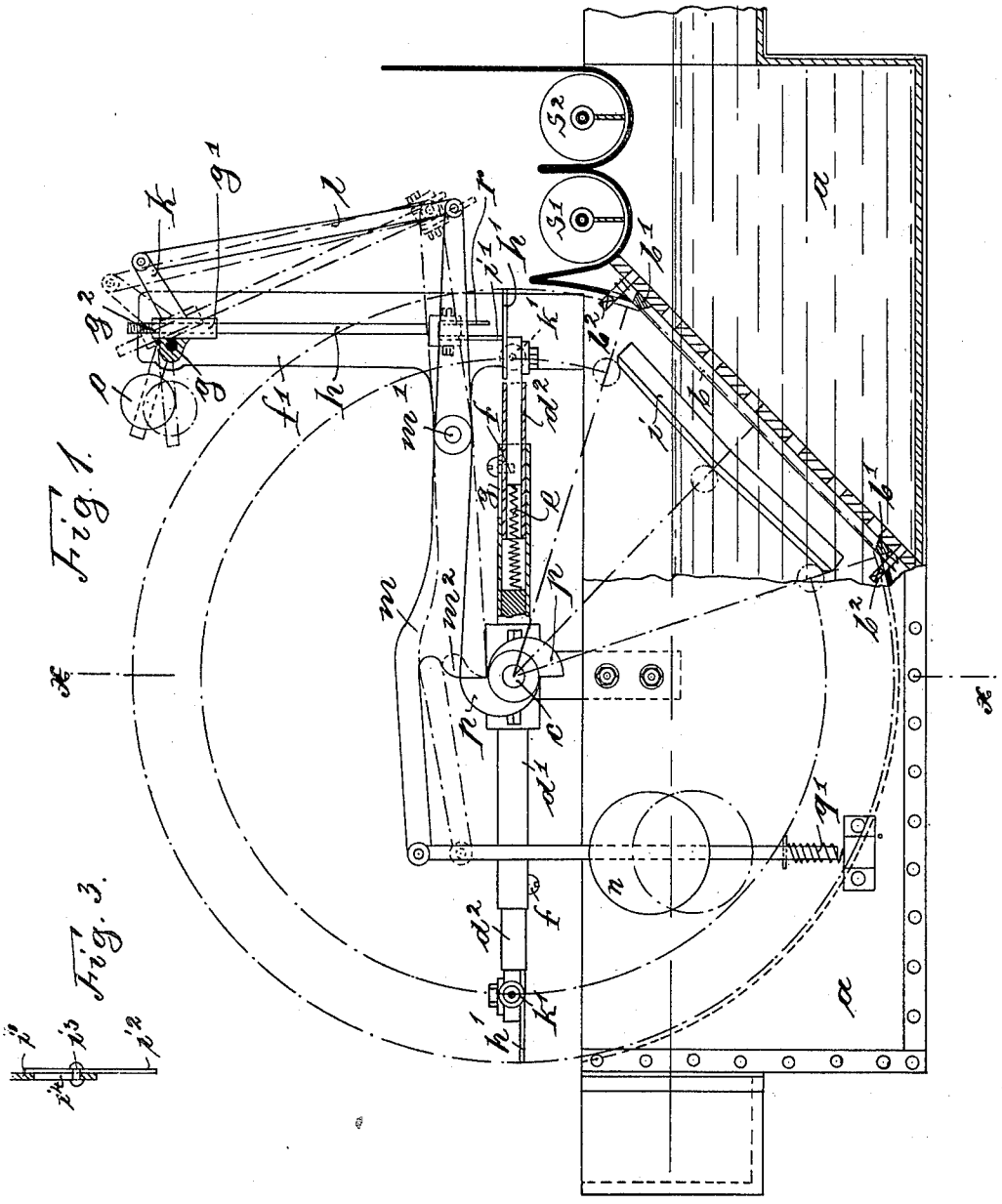


Fig. 1.

Fig. 3.

Witnesses:
Emil Kayser
Arthur Strotz.

Inventor
Hermann Riensch
by
Robert Seiffer
Attorney

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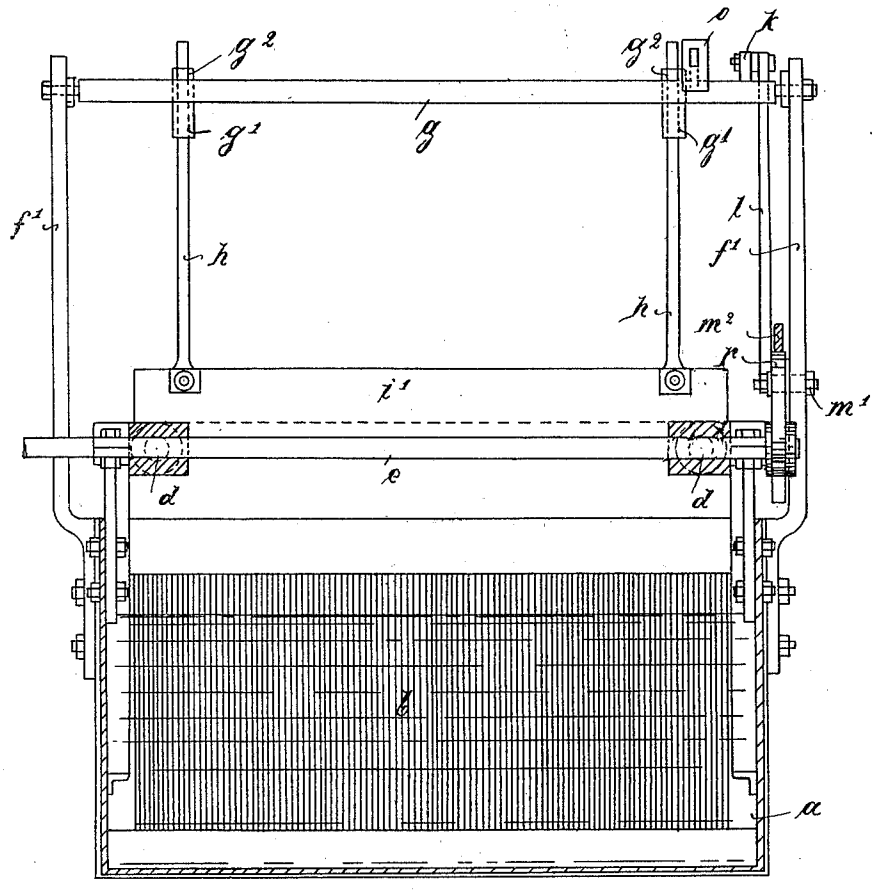
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H. RIENSCH.

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Fig. 2.



Witnesses
Arthur Scholz
Emil Kayser

Inventor
Hermann Riensch
by
Robert Reiple
Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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H. RIENSCH.

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Fig. 4.

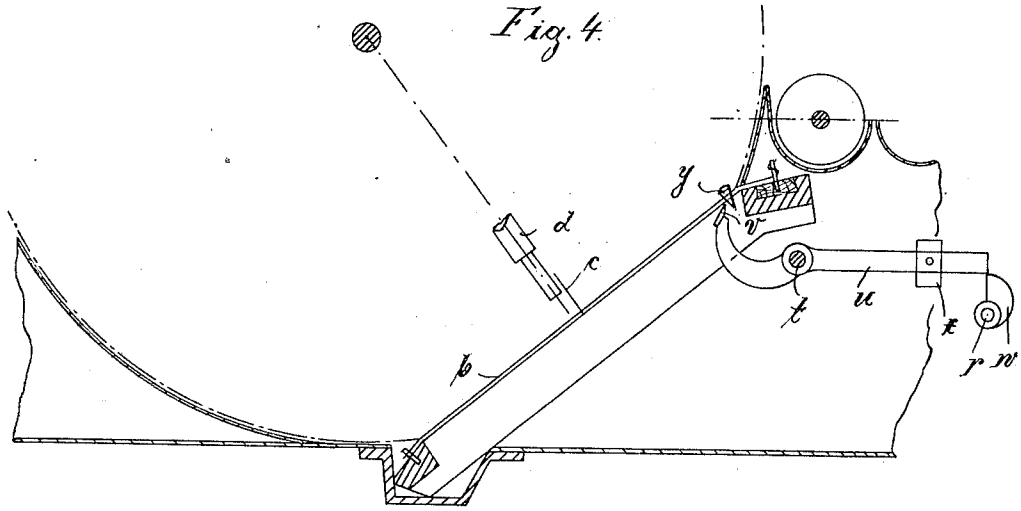
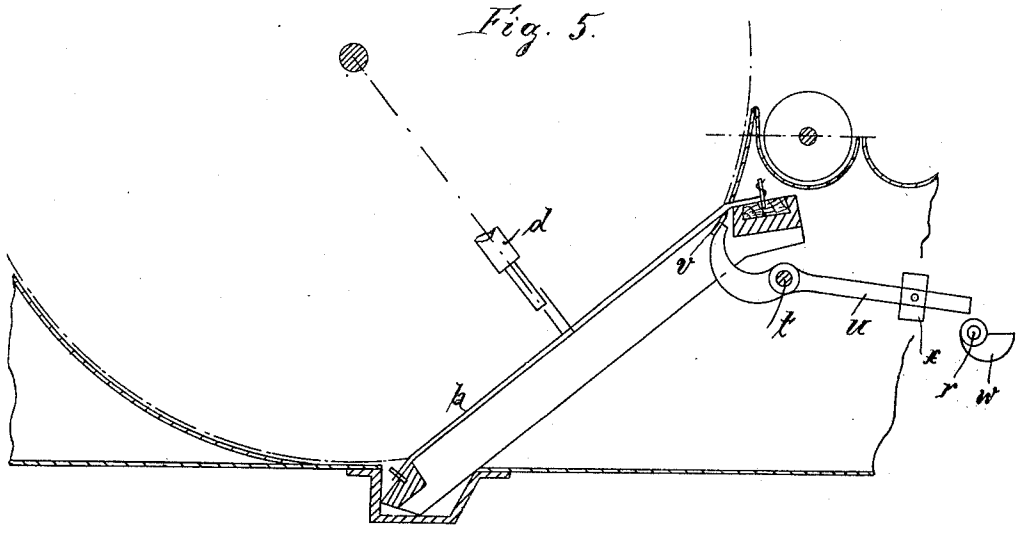


Fig. 5.



Witnesses
Arthur Scholz.
Emil Kayser.

Inventor
Hermann Riensch
by
Robert Seipler,
Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

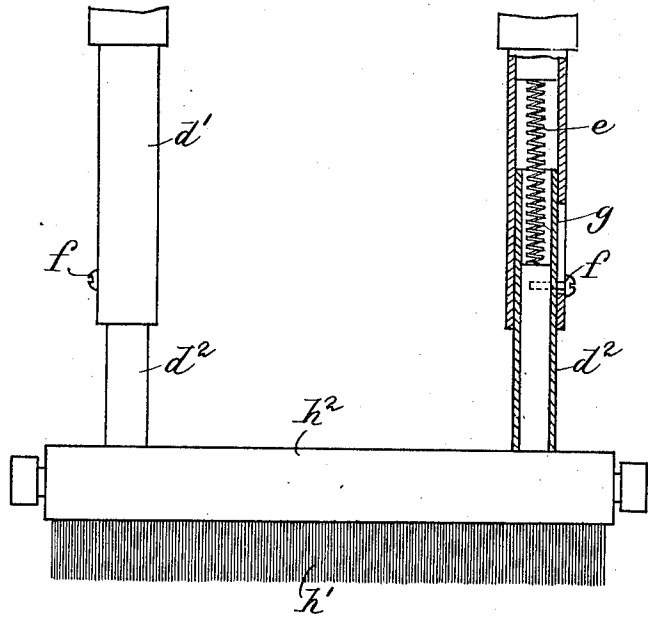
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H. RIENSCH.

APPARATUS FOR PURIFYING DIRTY WATER.

(No Model.) (Application filed Aug. 14, 1899.) 4 Sheets—Sheet 4.

Fig. 6



Witnesses:
Josef Löhre
Arthur Scholz

Inventor
Herrmann Riensch
by Robert Seiffert
Attorney

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HERMANN RIENSCH, OF UERDINGEN, GERMANY.

APPARATUS FOR PURIFYING DIRTY WATER.

SPECIFICATION forming part of Letters Patent No. 674,017, dated May 14, 1901.

Application filed August 14, 1899. Serial No. 727,202. (No model.)

To all whom it may concern:

Be it known that I, HERMANN RIENSCH, a subject of the King of Prussia, German Emperor, and a resident of Uerdingen-on-the-Rhine, in the Province of the Rhine, German Empire, have invented certain new and useful Improvements in Apparatus for Purifying Dirty Water, of which the following is an exact specification.

This invention relates to a mechanism for purifying dirty industry waters, and has for its object to provide an apparatus by means of which a regular constant work may be attained—that is to say, by means of which the substances accumulated upon the purifying-grates through which the dirty water flows are removed from the same in order not to stop in any respect the passing of the water. Practice has proved that this is a very difficult problem to solve by machinery, for the reason that the part located underneath the water surface suffered under the influence of the substances being mixed with dirty industry waters. These substances very often effected a stopping of the grates, so that the water took its way over the top of the grates and a purifying of any kind was not effected at all. To do away with all these drawbacks is the chief purpose of the apparatus forming the subject-matter of my present application.

As a purifying-grate I employ a grate formed by wires fixed in longitudinal direction within a frame arranged somewhat inclined underneath the water surface.

The apparatus essentially consists of rotating elastic combs, which by means of guide-rails and guide-rollers are conducted over the grate. These rotating combs raise the dirt accumulated upon the grate somewhat over the surface of the water, whereafter it is removed from the combs by a suitable mechanism.

My invention will be fully understood with reference to the accompanying drawings, and the description following hereinafter, in which drawings similar letters denote similar parts, and in which—

Figure 1 shows my apparatus partly in section and partly in side view. Fig. 2 illustrates a transverse section through line $x\,x$ of Fig. 1. Fig. 3 illustrates a detail view of the dirt-removing rail. Figs. 4 and 5 represent a mechanism for cutting and removing compact substances, such as tails of beet-root eventually mixed with the water. Fig. 6 is a detail view of the same.

In Fig. 1, a is a tank through which flows the water to be purified. b is a grate consisting of longitudinally-arranged wires. This grate is stretched over borders b' and fixed by means of plugs b^2. Above the tank a shaft c is suitably arranged. This shaft c carries two telescopic arms $d'\,d^2$. Springs e are provided for pressing the arms d^2 outward, the outward movement of these arms being determined by screw-bolts f, screwed into the arms d^2 and moving in slots g of the arms d'. The arms $d'\,d^2$ on their extremities are provided with rails h^2, carrying combs or teeth in form corresponding to the openings of the grate. These combs are not illustrated in the drawings, as they are of too small a size. On the side walls of the tank a guide-rails i are arranged, upon which guide-rails move rollers k', fixed to the arms d^2. When by suitable means rotation is imparted to the shaft c, the arms d' and d^2, with their combs h' and rollers k', traverse the way indicated by dotted lines, the combs moving in a circle until their rollers k' come to run upon the guide-rails i. From the drawings it easily can be seen that when the rollers come to run upon the guide-rail i the combs h' enter the grate. The elastic arms $d'\,d^2$ are shortened, so that the combs can pass freely through the grate, thereby removing the dirty substances accumulated upon the same. These substances remain upon the comb until the same has reached the position indicated in the drawings at the right on Fig. 1, whereafter they are removed upon worms for conducting them away by means of a mechanism described hereinafter. The grate may be of straight or other suitable form. In the example indicated a grate of straight form is employed. The guide-rails are somewhat slanting, so that at the center the distance between the rails and the grate is greater than at the extremities of the rails. Thereby the combs enter equally the grate at all places, notwithstanding the combs being placed inclined to the surface of the

grate when they enter and when they leave the same, while in the middle position they are directed quite angular to the grate.

In some cases brushes advantageously may be employed instead of combs. When now these latter have reached the position illustrated in the drawings at the right on Fig. 1, the dirt must be removed. To attain this end, use of the mechanism described hereinafter is made.

A shaft g has its bearing upon two standards f', arranged on the side walls of the tank a. A rail i' is suspended to this shaft g by means of two arms h. The shaft g further carries an arm k, which is connected to a double lever m, having its bearing at m'. This connection is effected by the connecting-rod l. A weight n is suspended to the free extremity of the lever. In order to counterbalance the weight of the rods, the shaft g carries a weighted lever o. Corresponding to the number of the dirt-removing combs cams p are fixed to the shaft c. These cams p influence the double lever m at the edge m^2—that is to say, at this edge they raise the lever until under the action of the weight n it falls down again. In order to prevent impacts, a spiral spring q' is suitably arranged.

In the highest position of the double lever m (illustrated in the drawings by black lines) the dirt-removing rail i' is moved backward. When now the lever m is disengaged, the rail i' is moved to the right, owing to the shaft g, the arm k, and the connecting-rod l, and the ingredients located upon the comb h' are removed from the same.

In order to attain a reliable contact of rail i' with the surface of the comb h', this rail consists of two parts, as clearly illustrated in Fig. 3. To the rail i' proper a second rail i^3 is slidably attached by means of bolts i^3, sliding within slots i^4 of the rail i'.

In Fig. 1, besides the dirt-removing rail i', a second rail r, shorter than the first one, is arranged. This second rail sometimes can be of importance—for instance, for purifying the dirty water of sugar-factories, which very often contains pieces or tails of beet-root. In these cases the shorter rail r would remove the substances of large diameter, while the longer rail i' removes substances of small dimensions. In the drawings two transporting-worms s' s^2 are arranged to conduct the dirt to any place desired. Evidently these worms can be replaced by transport-bands or similar other arrangements. The suspending rods h for the dirt-removing rails i, as illustrated in the drawings, pass through sockets g' in the shaft g and by means of screws g^2 are adjusted and kept in position. This suspension offers the great advantage that when the rail i' does not swing around in due time the comb simply raises the dirt-removing rail i', whereby the rods h are moved upward and pass through their sockets g'. Thereby no injuries may happen during the actuation of the apparatus. The before-described arrangement in most cases suffices to remove substances of a diameter not allowing their passing through the grates. Only in the purifying of certain dirty water—for instance, waste of sugar-factories—it may happen that sometimes tails of beet-root come into the grate and stop there. Evidently the fibers or tails of beet-root are removed by the removing-rail i'; but it may happen that some tails stop at the upper extremity of the grate. In order to prevent the accumulation of such objects, the same are cut by the mechanism, as illustrated in Figs. 4 and 5.

y represents the tail of a beet-root which has not been removed by the rails. A lever u is arranged upon a shaft t and carries a knife v. The opposite extremity reposes upon a cam w and is weighted by a weight x. At each revolution of the cam w this lever falls down, while the upper arm, with the knife, is pushed upward, thereby cutting the beet-root accumulated and allowing the dirt-removing rail i' to easily remove the substance from the grate.

Having thus fully described the nature of my said invention, what I desire to secure by Letters Patent of the United States is—

1. In an apparatus for purifying dirty water, the combination of a tank a with a grate b arranged inclined within this tank and fixed over stretching borders b' by means of bolts b^2, a shaft c' carrying telescopic arms d' d^2, springs e for pressing outward the arms d^2, combs h' arranged to the ends of the arms d^2, guide-rails i secured to the side walls of the tank a, rollers k' fixed to the arms d^2 and adapted to roll over said guide-rails i, thereby allowing the combs h' to enter the openings of the grate b, for the purpose and substantially as set forth.

2. In an apparatus for purifying dirty water, the combination of a tank a, with a grate b, arranged inclined within this tank and fixed over stretching borders b' by means of bolts b^2, a shaft c' carrying telescopic arms d' d^2, spiral springs e arranged within these arms and pressing outward the arms d^2, combs h' arranged to the end of the shaft, guide-rails i secured to the side walls of the tank a, rollers k' fixed to the arms d^2 and adapted to roll over said guide-rails i, standards f supporting a shaft g, dirt-removing rails i' movably suspended to the shaft by means of suspending-rods h guided through the socket g' and fixed by means of screws g^2, a double lever m being weighted by a weight n and connected to the shaft g by means of connecting-rods k and l, cams p arranged upon the machine-shaft c effecting the rocking movement of the lever m and the displacement of the dirt-removing rail i', a rail r of shorter length than i' fixed to the rods h, and means for counterbalancing the weight of the connecting-rods, transporting-worms s' and s^2 taking up the dirt from the combs h', for the purpose and substantially as set forth.

3. In an apparatus for purifying dirty wa-

ter, the combination with a lever u fixed to shaft t and weighted by means of a weight x, of a cam w effecting a rocking movement of the lever m, and a knife v fixed to the free extremity of the lever and pressing against the upper extremity of the grate, for the purpose and substantially as set forth.

In witness whereof I have hereunto set my hand in presence of two witnesses.

HERMANN RIENSCH.

Witnesses:
WM. ESSENWEIN,
GEO. P. PETTIT.