March 22, 1932. P. T. ROBATEL 1,850,140

CONTINUOUS ROTARY SEPARATOR

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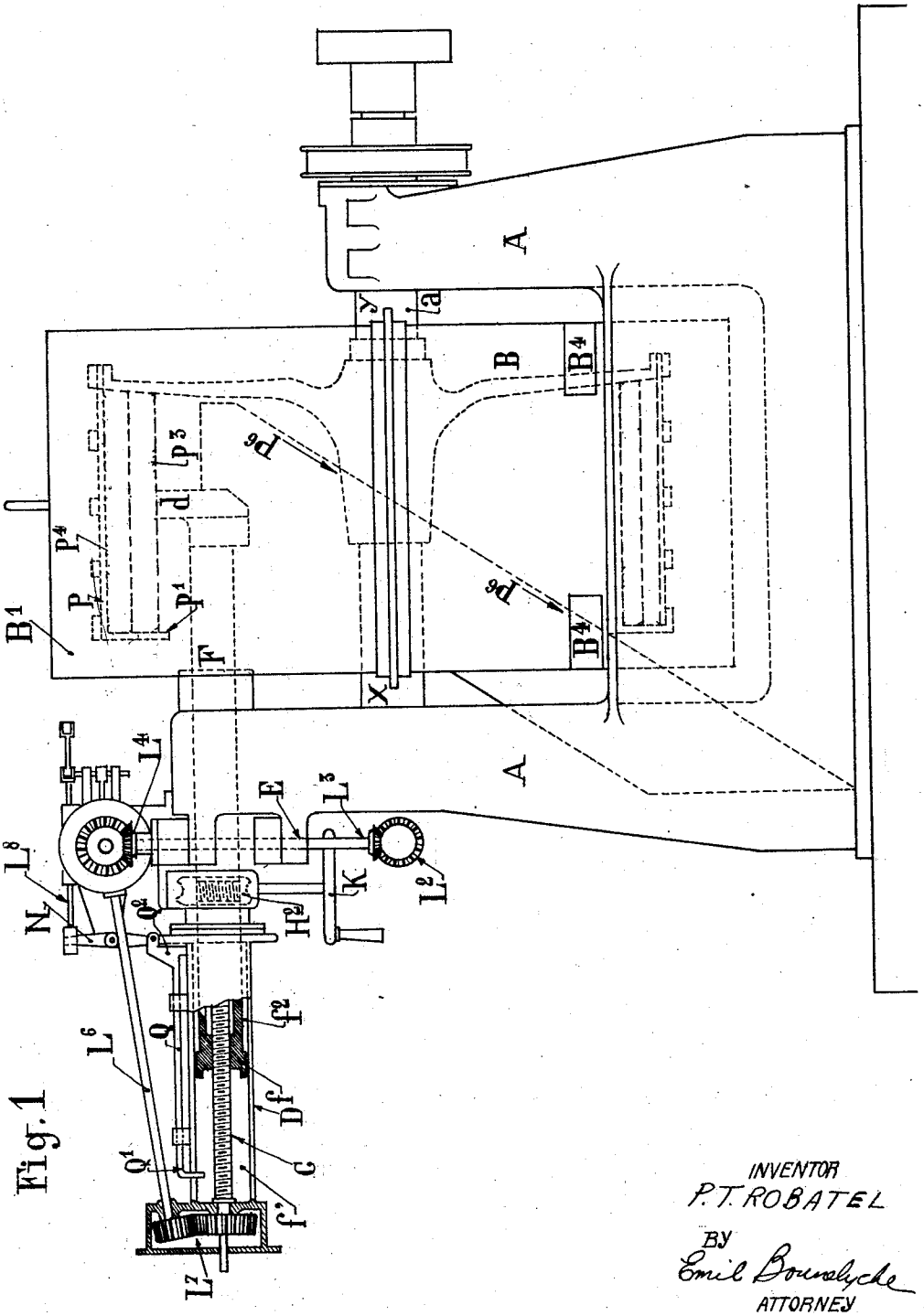

Fig. 1

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Fig. 2

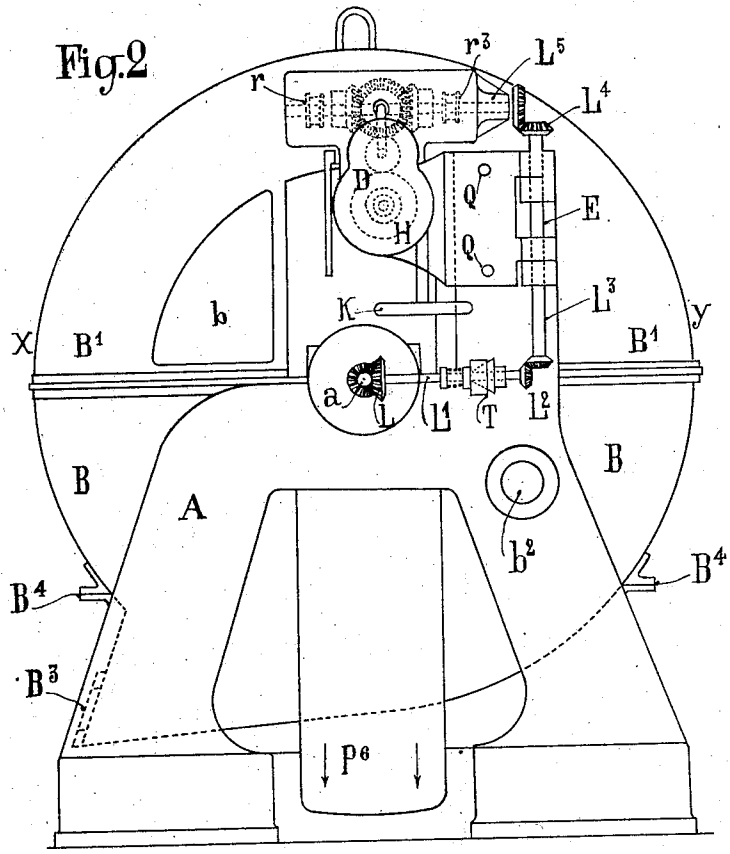

Fig. 3

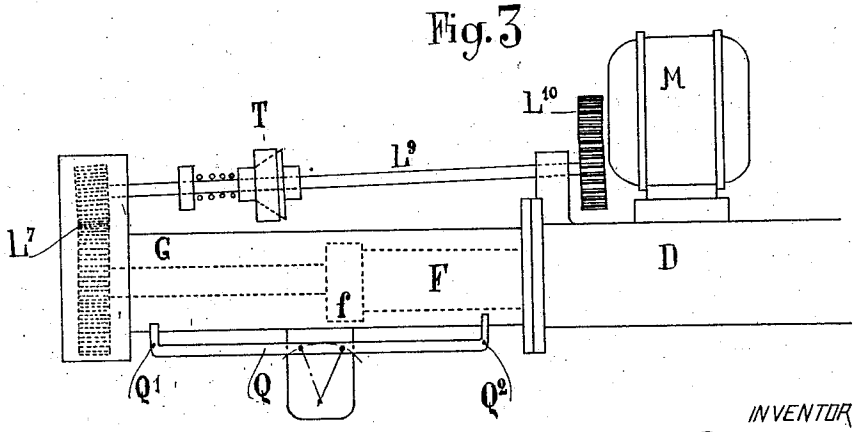

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Fig. 5

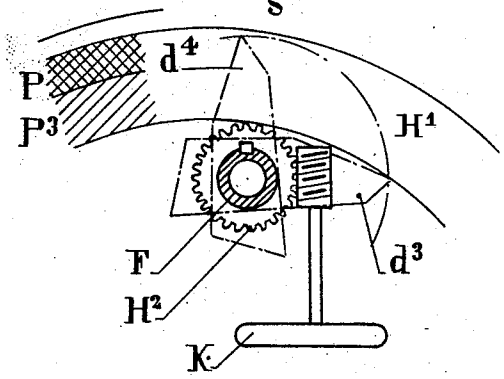

Fig. 6

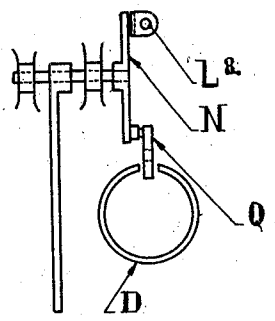

Fig. 4

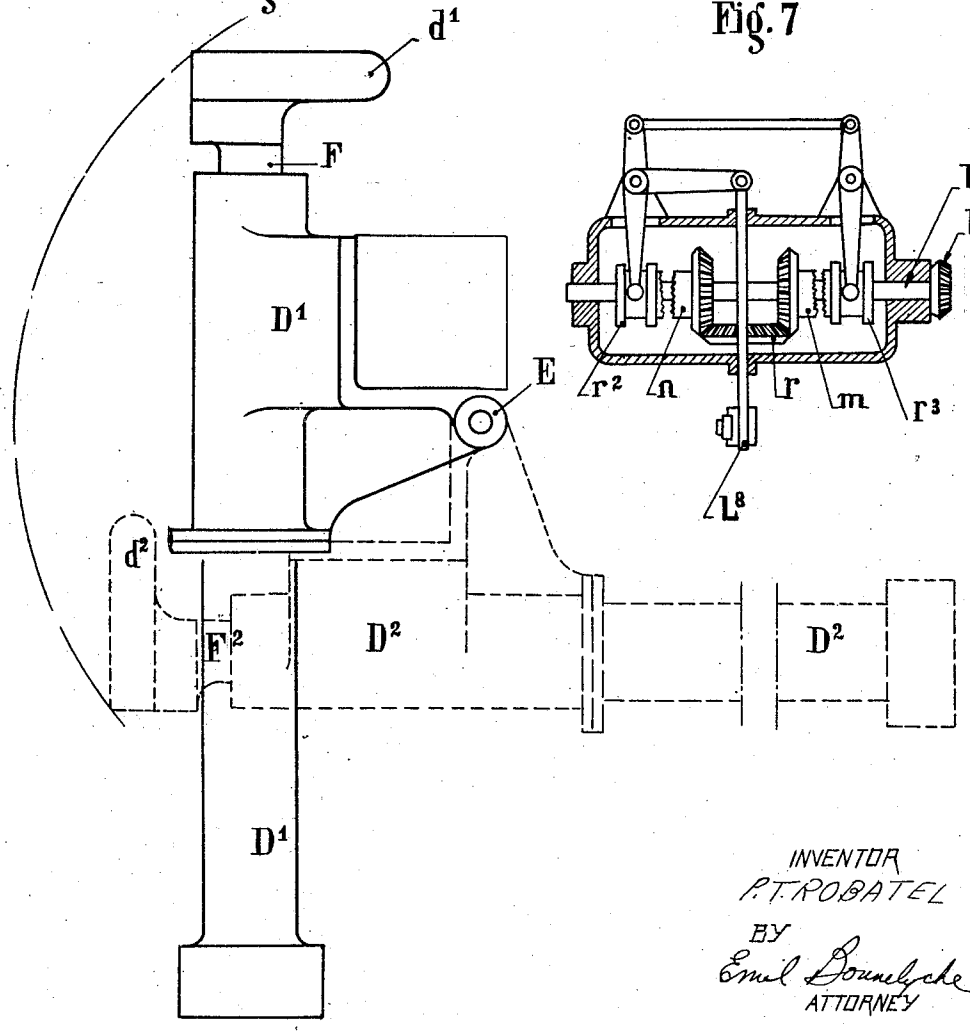

Fig. 7

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UNITED STATES PATENT OFFICE

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CONTINUOUS ROTARY SEPARATOR

Application filed December 27, 1928, Serial No. 328,637, and in France February 16, 1928.

This invention relates to continuous rotary separators, of the type in which the basket is mounted to rotate about a horizontal axis; such separators being capable of use with equal facility either for filtration purposes, or for centrifugal decantation where filtration is not possible.

The invention resides in the provision of certain improvements, hereinafter fully described and explained, in or relating to the mounting of the extractor knife which is utilized for scraping off the material deposited upon the wall of the rotating basket by centrifugal force; the means provided for adjusting the angular position of the knife; and the means or mechanism for effecting its rectilinear reciprocating movement.

Other improvements relate to the construction of the frame of the machine as completely independent of the casing wherein the basket is disposed, so that the two may be made of different metals; and so that the casing, if worn out or corroded by the action of the liquids treated, may be repaired or replaced without dismounting the mechanism or the frame.

Still other and further improvements are also involved in the invention, and will be set forth in due course in the description which follows.

In the accompanying drawings,

Figure 1 is a side view, partly in section, of an apparatus embodying the invention;

Fig. 2 is a face view;

Fig. 3 shows a modification of the knife-actuating means;

Fig. 4 is an enlarged view showing the knife and its carrier in different positions;

Fig. 5 is an enlarged detail of the knife mounting;

Fig. 6 is an end view of the knife guide and related parts; and

Fig. 7 is a plan view of the reversing clutch.

Referring more particularly to Figs. 1 and 2, A indicates the framework of the apparatus, and B, B′ a cylindrical casing open at one side and having disposed within it a basket P which, for the most part, is also open at the same side as the casing; said basket being mounted on a horizontal shaft *a* (Fig. 2), suitably journaled in the side members of frame A and driven from any desired source of power. The frame and casing thus are completely independent of each other, as has been stated, and can be made of different metals.

It will be observed that one of the two standards or side members of frame A is higher than the other; the upper portion of such standard being utilized to support the various parts or elements that are provided for carrying and mounting the knife or scraper *d*. This element has the form of a spoon with sharpened edges, and it is rigidly secured to the outer end of a hollow arm or sleeve F which is mounted for endwise movement in either direction, with slight friction, in a hollow guide D; said arm F having a length such that its forward portion extends normally into the interior of basket P so as to enable the knife or scraper *d* to travel along the circumferential wall of the basket and shave or scrape off the deposited material. The guide D and associated parts have a hinge connection E with the aforesaid upper portion of the taller standard, so as to enable them to be swung horizontally as a unit around the vertical pintle of the hinge and thereby enable the knife to move through the open sides of the casing and basket into and out of the interior of the latter, in order to be repaired, without requiring any dismounting; this movement being accomplished in any desired manner.

As has already been stated, the knife is intended to travel, from front to back and vice versa, parallel with the basket axis, without stopping or reducing its full-speed rotation, passing to the rear wall *p*2 of the basket and returning to the front thereof where said basket is open and provided merely with a narrow rim *p*1 to keep the materials deposited in the basket against the circular wall thereof.

The forward and backward movements of the knife are effected by means of a screw or threaded spindle G which rotates alternately, in the two directions required, in the threaded bore of the tubular knife-carrying arm F (Fig. 1). The necessary movements are

imparted to screw G by a system of gears and shafting operated by the basket shaft *a*; such system (see Figs. 2 and 7) comprising a short horizontal shaft L1 connected at one end by a pair of intermeshing gears L with the adjacent end of shaft *a*, and at the other end by similar gears L2 with the lower end of a vertical shaft L3 (which, incidentally, forms the pintle of hinge E), such arrangement enabling the knife to be withdrawn from or to enter the basket without disturbing the mechanism that controls it. The shaft L3 is connected at its top with a horizontal clutch shaft L5 by a pair of gears L4, and said clutch shaft carries two reversely-arranged gears *m* and *n* (see Fig. 7) loosely mounted thereon in mesh with a central gear *r* fixed to another transmission shaft L6 which is connected to drive the screw G by a pair of intermeshing gears L7. The gears *m* and *n* are provided with toothed hubs or clutch portions, and are adapted to be made fast to shaft L5 by clutch sleeves *r*2 and *r*3 which are keyed to slide on said shaft into and out of engagement with gears *n* and *m*, and are actuated at the proper times by another set of levers operated by a shifting rod L8. The last-named levers include a controlling lever L11 to which one end of rod L8 is pivoted, a double-armed lever L12 to which lever L11 is connected to be rocked thereby, and a rod L13 joining the outer end of lever L12 with the corresponding end of a second double-armed lever L14; the inner ends of the two levers L12 and L14 being slidably engaged in the grooves of the clutch sleeves *r*2 and *r*3, respectively.

The clutch shaft L5 is constantly in motion; and when one of the gears *m* or *n* is coupled to the clutch sleeve *r*3 or *r*2 by the movement of shifting rod L8, said shaft L5 drives the transmission shaft L6 by means of the central gear *r* of the clutch mechanism; said gear turning in one or the other direction according as gear *m* or gear *n* is in mesh therewith. The rotation of the basket shaft *a* is transmitted through gears L to shaft L1, thence to shaft L3 through gears L2, and thence through gears L4 to the clutch shaft L5, thereby effecting its aforementioned constant rotation. The rotation of the central clutch gear *r* is transmitted, through shaft L6 and gears L7, to screw G, which is driven alternately in opposite directions by the action of the reversing clutch, as will be understood, thereby causing the endwise-reciprocating knife carrier or arm F to change its direction of travel.

The reversing operation is preferably automatic, and is effected by means of a slide rod Q which is connected with guide D in a manner to enable it to move longitudinally, relatively to and exteriorly of said guide, in either direction; said rod having inturned stops Q1 and Q2 at its opposite ends, the second-named stop being pivotally connected to a lever N that is utilized to actuate the rocking shifter bar L8. The outer end of arm F is formed with an enlargement or collar *f* providing outer and inner shoulders *f*1 and *f*2 that are adapted to hit against one or the other stop on the slide Q when the arm or carrier F is just about to complete its movement in either direction, when the knife comes nearly into contact with the front wall or rim *p*1 or the rear wall *p*2 of the rotating basket P.

The knife *d* must assume two different angular positions, shown in dotted lines at *d*3 and *d*4 in Fig. 5. It occupies the position *d*3 during the filtering or decanting operation, in order to prevent it from contacting with the annular layer of liquid P3 which is in motion in the rotating basket and, in consequence, terminating such motion. The other position *d*4 is occupied when the material P4 deposited on the basket wall is to be removed after the liquid has been discharged, either by filtering the liquid through said wall or by means of a suction device in case an unperforated basket is used.

The rotation of arm F, in order to bring the knife into one or the other position, is obtained by means of a worm H1 mounted on the spindle of a handwheel K and meshing with a worm wheel H2 keyed to said arm. The handwheel is actuated at the moment when the removal of the solid residue must take place, or when it is necessary to recommence a filtering or a decanting operation after the removal has been effected, such operation taking place at full speed.

The modified drive for the reversible transmission system and the screw G illustrated in Fig. 3 is independent of the basket drive. According to this arrangement, an electric motor is provided and is connected by gears L10 with the transmission shaft L9 (which replaces the shaft L6 of the first form). In both forms, however, a spring clutch T is provided to enable the knife to slip on encountering an abnormal resistance in the basket.

I claim as my invention:—

A rotary separator, comprising a rotary basket, a driving shaft for said basket, a scraper, means for feeding said scraper back and forth within said basket, and a connecting shaft between said driving shaft and said feeding means, said feeding means and scraper being swingable about said connecting shaft.

In testimony whereof I affix my signature.

PHILIBERT TOBIE ROBATEL.