A. HEIMANN & L. FLATOW.

PUMP.

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939,911.

Patented Nov. 9, 1909.

Fig. 1,

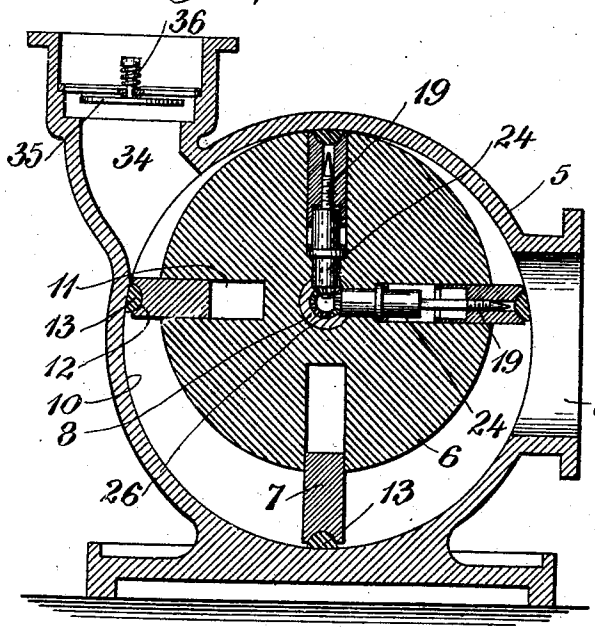


Fig. 2,

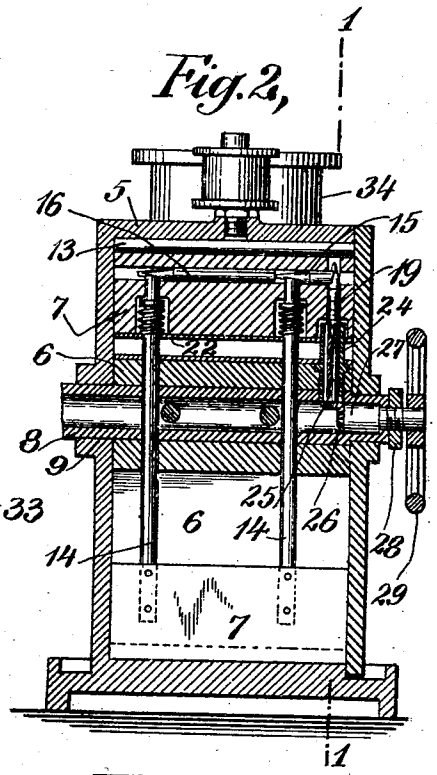


Fig. 3

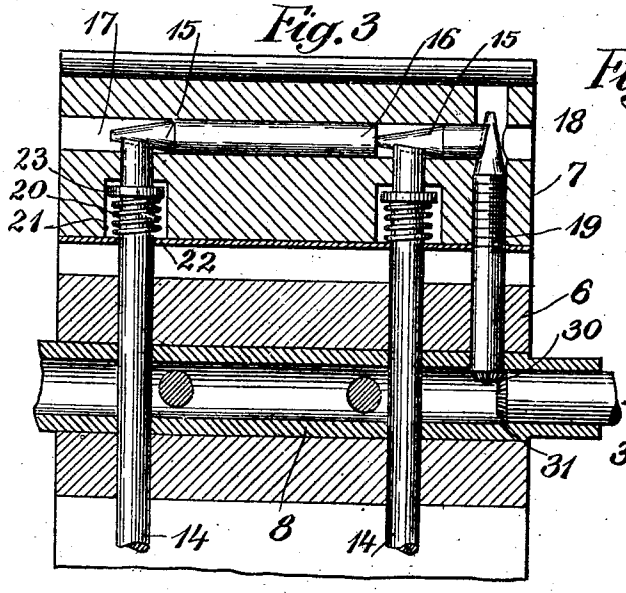
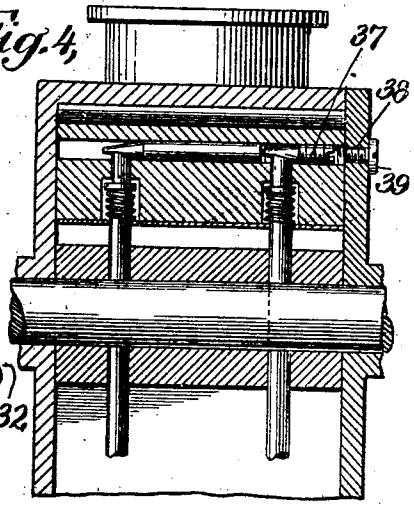


Fig. 4,



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PUMP.

939,911. Specification of Letters Patent. Patented Nov. 9, 1909.

Continuation of application Serial No. 341,550, filed November 1, 1906. This application filed December 23, 1907. Serial No. 407,619.

To all whom it may concern:

Be it known that we, ALBERT HEIMANN, a citizen of the United States of America, and a resident of New York city, county, and State, and LEO FLATOW, a subject of the Emperor of Germany, and a resident of New York city, county, and State, have invented certain new and useful Improvements in Pumps, of which the following is a specification, reference being had to the accompanying drawings, forming a part thereof.

Our invention relates to improvements in pumps, and particularly to improvements in rotary pumps of the type employing a substantially cylindrical casing, and a hub mounted to rotate therein upon a center eccentric of the center of the casing, said hub carrying radial paddle blades which move toward and away from the center of the said hub as the said hub revolves.

This application is a continuation of an application Serial Number 341,550, filed by us on November 1, 1906.

The main object of our invention is to provide an adjustment for the paddle blades in the radial lines in which they move, so as to take up for wear between the outer surfaces of the said paddle blades and the inner surfaces of the casing and particularly to provide for the parallel adjustment thereof, that is to say, for the adjustment equally of both ends of the blades. In the preferable form of mechanism which we employ for this purpose, said adjustment is effected through the center of the shaft upon which the said hub revolves, whereby access may be had to the said adjusting means, and said adjustment effected without opening up or dismantling the pump in any way.

In order that our invention may be fully understood, we will now proceed to describe a pump constituting an embodiment thereof, having reference to the accompanying drawings illustrating same, and will then point out the novel features in claims.

In the drawings: Figure 1 is a view in transverse sectional elevation through the pump, the plane of section being substantially upon the line 1—1 of Fig. 2. Fig. 2 is a view in central longitudinal section through the pump. Fig. 3 is an enlarged detail view in central longitudinal section of certain parts of the pump showing a modified construction of the adjusting means for the paddle blades. Fig. 4 is a detail view in central longitudinal section, showing a further modification.

The pump comprises generally a casing 5, a rotating hub 6 mounted therein, and radial paddle blades 7 carried by the hub. The interior of the casing 5 is of substantially cylindrical form. The hub 6 is mounted upon a shaft 8, said shaft mounted to rotate in bearings 9 formed as a part of the pump casing. The axis of rotation of the shaft 8 is eccentric with respect to the axis of the interior walls 10 of the casing 5. The interior walls 10 are not truly cylindrical, though their form is substantially cylindrical, as stated. Actually, the distance between the opposite walls 10 is always the same upon any straight line which passes through the axis of the shaft 8, and for this reason the opposite paddle blades 7 may be, and are, connected together. The said paddle blades work freely in pockets 11 in the hub 6, so that they may move backward and forward radially, but, in the normal operation of the pump, the distance between the opposite blades is never varied. At their outer faces the paddle blades are provided with curved surfaces 12 to which are fitted wearing shoes 13. The outer faces of the wearing shoes 13 are fitted to the curve of the inner walls of the casing 5, while the inner faces of the wearing shoes 13 are fitted to the curve of the recesses 12.

It will be readily understood that a certain amount of wear will take place between the outer faces of the wearing shoes 13 and the inwardly facing walls 10. In order to compensate for this, I have provided means for adjusting the opposite paddle blades 7 with respect to each other. Taking any two opposite blades, one of the said blades has rigidly secured thereto stems 14 which project inwardly therefrom, passing through the shaft and extending outward upon the opposite side thereof into recesses in the opposite blade. The ends of these stems engage cam surfaces 15 carried by a cam piece 16, which cam piece is mounted in a longitudinal bore 17 in the said paddle blade. At one end the said cam piece engages the conical end 18 of an adjusting stem 19, which adjusting stem has a screw-threaded connection with the paddle blade 7 aforesaid. A rotation of the adjusting stem 19

in one direction will force the cam piece 16 in such a direction as to separate the opposite paddle blades with respect to each other, that is to say, to lengthen them diametrically with respect to the pump, whereby wear may be compensated for. Springs 20, arranged in suitable recesses 21 in the paddle blade which carries the cam piece 16 and adjusting stem 19, normally oppose the outward or separating movements of the paddle blades with respect to each other, thereby preventing any looseness or rattling of the blades at any time. The said springs 20 bear upon one side against a plate 22 secured to one paddle blade, and on the other side against collars 23 which are secured upon the stems 14, which are themselves fast to the other paddle blade 7.

Referring for the moment more particularly to the example of our invention shown in Figs. 1 and 2, the adjusting stem 19 extends into a sleeve 24, said sleeve mounted to rotate in the hub 6, but held against longitudinal movement therein. The stem 19 and sleeve 24 are connected together by a spline connection, whereby the stem is free to move longitudinally with respect to the sleeve, but is compelled to partake of its rotary movement. At its inner end the sleeve 24 is provided with bevel gear teeth 25, which are arranged in mesh with bevel gear teeth 26 upon a spindle 27, which is received within a hollow portion of the shaft 8. This shaft 27 is normally locked to the shaft 8 by means of a lock nut 28, but is provided with a hand wheel 29 by which it may be turned when freedom of movement is permitted to it by loosening the said lock nut. Manipulation of the hand wheel 29 to rotate the spindle 27 will rotate the sleeve 24 and so adjust the stem 19. Adjustment of the stem 19 will cause such a movement of the cam piece 16 as to adjust the opposite paddle blades 7—7 with respect to each other, and as there is one set of such mechanisms for each pair of blades employed, each said mechanism including connecting stems 14, cam piece 16, adjusting stem 19, sleeve 24, and bevel gear teeth 25, it follows that all the paddle blades may simultaneously be adjusted by the manipulation of the hand wheel 29 aforesaid. The sliding connection between the adjusting stem 19 and the sleeve 24 is provided to permit of the free movement of the paddle blades 7 in and out of their recesses 11, without thereby effecting the intermeshing of the bevel gear teeth 25 upon the sleeves 24 with the bevel gear teeth 26 upon the spindle 27. Such an arrangement is not absolutely necessary, however, as in Fig. 3 we have shown a modification in which there is no such provision. In this modification the stem 19 is itself provided at its inner end with bevel gear teeth 30, which intermesh with bevel gear teeth 31 upon the end of a spindle 32, which may be inserted and removed at will. In this example of our invention the spindle 19, with its gear teeth 30, will reciprocate in the hub 6, the teeth 30, which form a bevel gear wheel, being alternately withdrawn from the position in which they are shown in Fig. 3 to a position at some distance outward from such position. In this construction, when it is desired to adjust the paddle blades, the hub 6 will be rotated to such a position as to bring the gear teeth 30 at a point to properly intermesh with the gear teeth 31, and the spindle 32, which is ordinarily removed from position in the shaft 8, will be inserted and caused to intermesh with the said teeth. A rotation of the spindle 32 will then adjust the pair of paddle blades controlled by the adjusting stem 19. To adjust another set of paddle blades it will then be necessary to rotate the hub 6 through a portion of a revolution sufficient to bring another adjusting stem 19 in a position to have its teeth 30 engaged by the teeth 31 on the spindle 32, when adjustment thereof may be made in like manner. The spindle 32 may now be withdrawn, as above explained, either entirely or to a point where its teeth 31 will fail to register with the teeth 30 of the adjusting spindle 19.

By either of the foregoing methods it will be seen that ready adjustment of the paddle blades may be made to compensate for wear, such adjustment being obtained without opening the pump casing or dismantling the pump in any way.

In Fig. 4 the adjusting stem for the cam piece is shown in line therewith as appears at 37. In such case the casing 5 is provided with an opening 38, closed normally by means of a plug 39, through which a tool may be introduced to effect the desired adjustment. In this form as in the others a parallel adjustment of the blades is assured, though the first forms are preferable in that they do not require the casing to be opened in any way when an adjustment is to be effected.

The casing 5 of the pump herein illustrated is provided with an intake 33 and a discharge 34. In the discharge 34 is arranged a valve 35 constructed to open outward, and provided with a light spring 36, which preferably just overbalances the weight of the valve 35, whereby the normal position of the valve will be open. By this arrangement the valve will not in any way oppose clear passage of fluid through the discharge 34, but, should the pump be operating at any time when the intake is closed, so that the fluid contained in the intake and in the casing will all or nearly all be discharged, the valve 35 will close to prevent a return of air into the casing, whereby the member 6 and paddle blades carried thereby

will be left to rotate in a partial vacuum. This will effect a saving of power, for the reason that less resistance will be offered to the rotation of the said rotary member, as will be well understood.

What we claim is:

1. A rotary pump comprising a casing, an eccentrically arranged hub, diametrically arranged paddle blades carried by the hub, stems for connecting the said paddle blades together, and means operating concentrically with the said hub, but controlled from the exterior thereof, for adjusting the said connection, whereby the distance between the two said paddle blades may be lengthened or shortened.

2. A rotary pump comprising a casing, an eccentrically arranged hub, diametrically arranged paddle blades carried by the hub, stems for connecting the said paddle blades together, and a single adjusting stem, longitudinally disposed within the said hub, and having a plurality of cam surfaces, one for engagement with each said connecting stem, for simultaneously operating upon the said connecting stems to uniformly adjust the same, whereby the distance between the two said paddle blades may be lengthened or shortened.

3. A rotary pump comprising a casing, an eccentrically arranged hub, diametrically arranged paddle blades carried by said hub, stems for connecting the said paddle blades together, said stems secured fast to one paddle blade and having a sliding fit with the other said paddle blade, and means operating concentrically with the said hub, but controlled from the exterior thereof, for adjusting the latter said paddle blade with respect to the stems, whereby the distance between the two said paddle blades may be increased or decreased.

4. A pump comprising a casing, a hub eccentrically mounted with respect thereto, radial paddle blades carried thereby, a rotary adjusting stem arranged to radially adjust the said paddle blades, and a spindle, disposed concentrically with respect to said hub, arranged to engage the inner end of said adjusting stem for effecting the said adjustment.

5. A rotary pump comprising a casing, a hub eccentrically mounted with respect thereto, a radial paddle blade carried thereby, a rotary adjusting stem carried by said paddle blade, and means for rotating said stem from the exterior of said casing.

6. A rotary pump comprising a casing, a hub eccentrically mounted with respect thereto, a radial paddle blade carried thereby, a rotary adjusting stem carried by said paddle blade, said stem provided with gear teeth, and a spindle having gear teeth for engaging the gear teeth of said spindle, mounted concentrically with respect to the said hub.

7. A rotary pump comprising a casing, a hub mounted eccentrically thereof, radial paddle blades carried by said hub, an adjusting spindle for adjusting said paddle blades, a sleeve with which said adjusting spindle has a splined connection, said sleeve provided with gear teeth at its inner end, and an operating spindle mounted concentrically with respect to the said hub, having gear teeth arranged to engage the gear teeth of said sleeve.

8. A rotary pump comprising a casing, a hub mounted eccentrically thereof, diametrically opposed paddle blades carried by said hub, connecting stems for connecting the two said paddle blades together, longitudinally disposed cam means engaging the said stems, a radial adjusting stem engaging said cam means, and means for rotating said adjusting stem.

9. A rotary pump comprising a casing, a hub mounted eccentrically thereof, diametrically opposed paddle blades carried by said hub, connecting stems for connecting the two said paddle blades together, longitudinally disposed cam means engaging the said stems, and a single rotatable adjusting stem for the said cam means.

10. A rotary pump comprising a casing, a hub mounted eccentrically thereof, diametrically opposed paddle blades carried by said hub, connecting stems for connecting the two said paddle blades together, longitudinally disposed cam means engaging the said stems, a radial adjusting stem engaging said cam means, and means operated from the exterior of the pump casing for adjusting the said stem.

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