W. H. W. HAMILTON.

PUMP.

APPLICATION FILED APR. 10, 1909.

966,684.

Patented Aug. 9, 1910.

Fig. 1

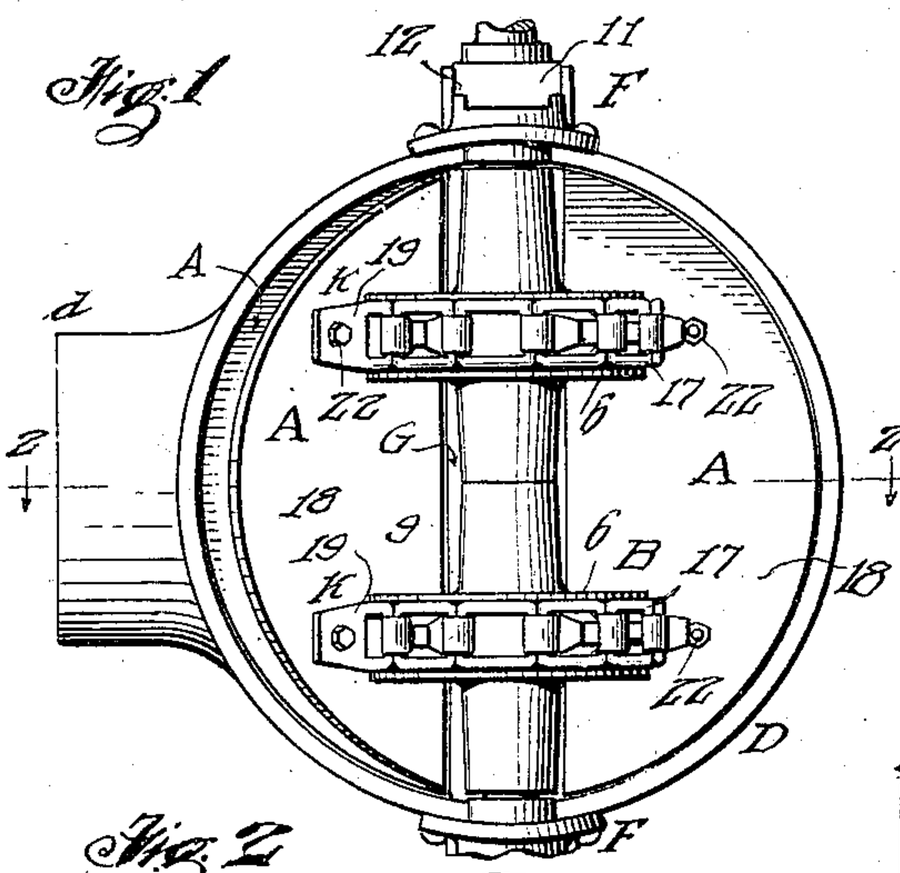


Fig. 2

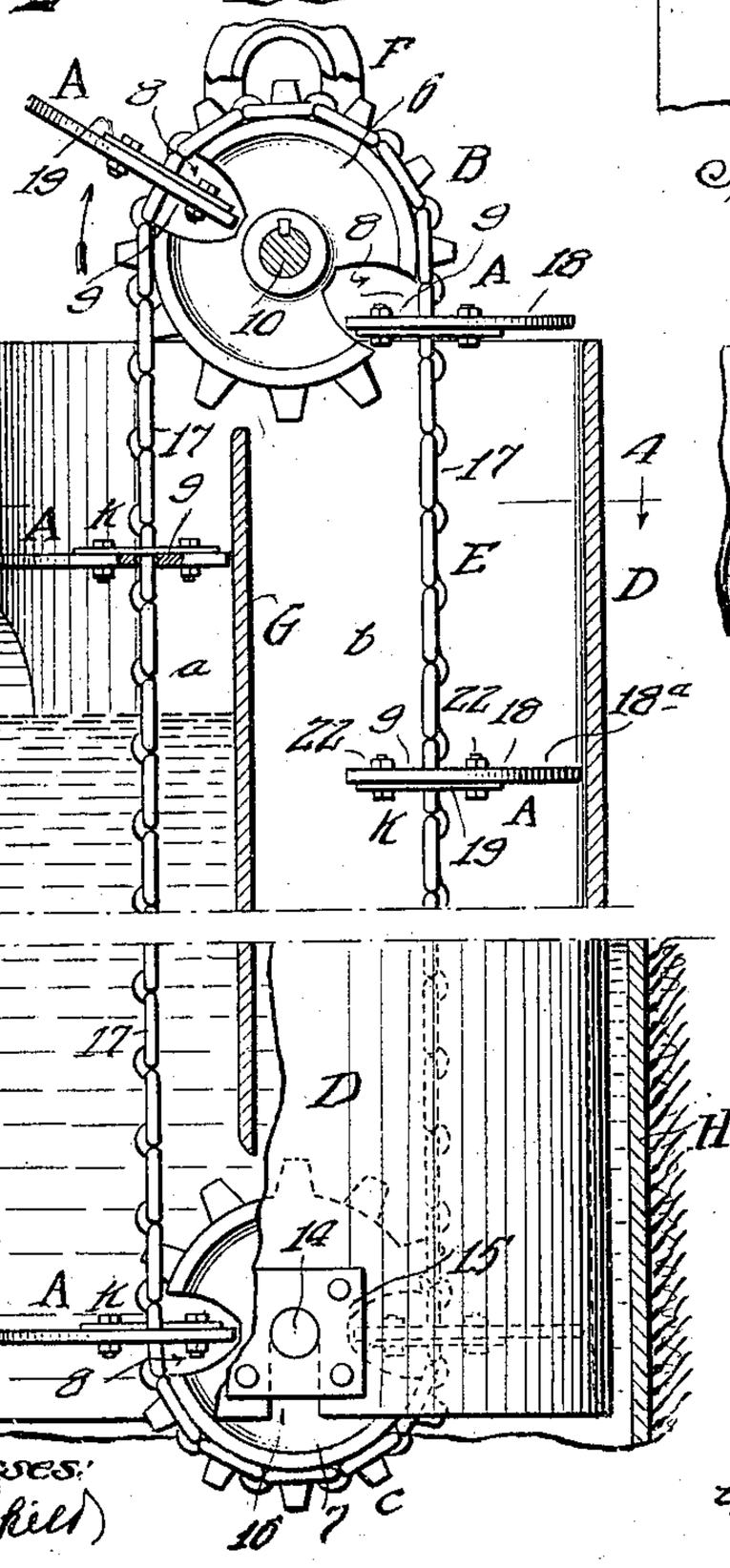


Fig. 3

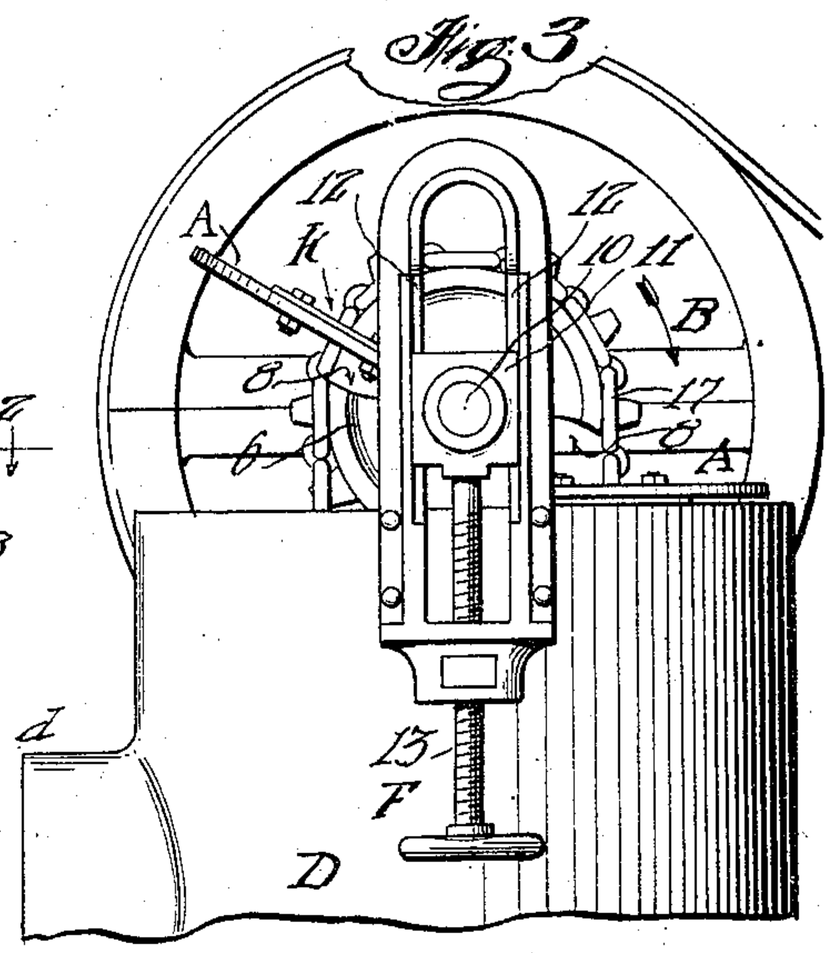


Fig. 4

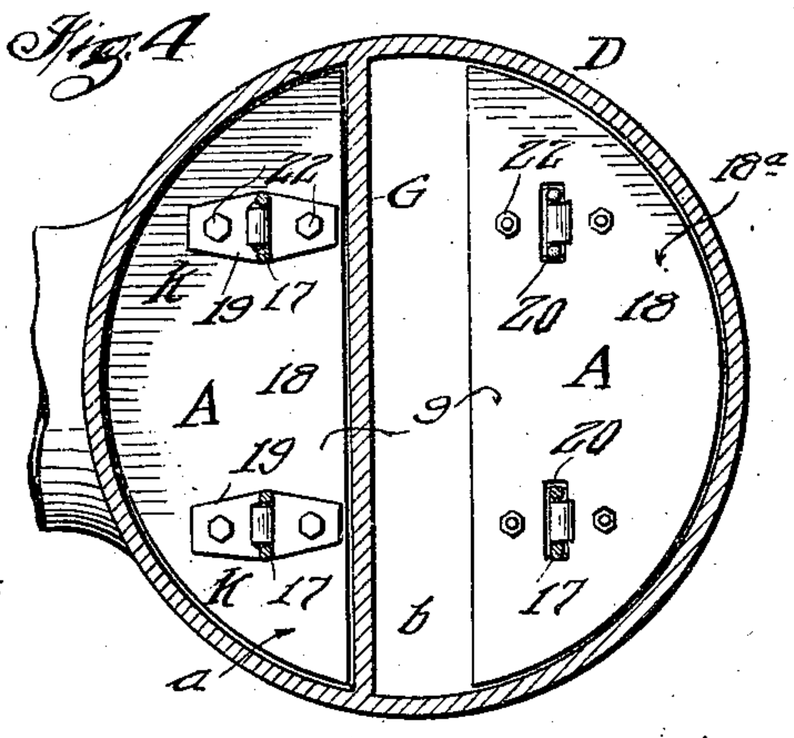
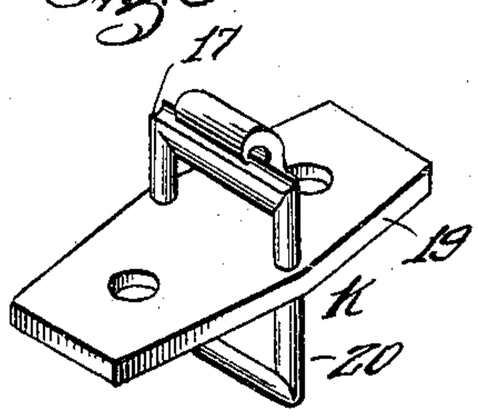


Fig. 5



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UNITED STATES PATENT OFFICE.

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PUMP.

966,684. Specification of Letters Patent. Patented Aug. 9, 1910.

Application filed April 10, 1909. Serial No. 489,211.

To all whom it may concern:

Be it known that I, WILLIAM H. W. HAMILTON, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Pumps, of which the following is a specification.

This invention relates to pumps, and it has for its object to provide improvements in pumps particularly adapted for the elevation of fluids supplied by Artesian and other wells; which improvements will be superior in point of simplicity and relative inexpensiveness of construction, positiveness in operation, facility in installation and repair, and which will be generally superior in efficiency and serviceability.

A particular object of the invention consists in the provision of a pump and pump mechanism constructed and adapted to fit and be installed in circular or approximately circular well casings of Artesian and other wells, the normal and proper flow of which has ceased. Comprised in the improved pump structure is a casing formed to fit within the well casing and provided with a longitudinal or vertical transverse partition forming two passages or compartments traversed respectively by the ascending and descending buckets or flights. The latter elements are connected with a flexible conveyer or flexible conveyers, which is, or are trained over supporting and actuating rotary elements. Preferably, the buckets or flights are connected with a link belt or link belts trained over and about sprocket wheels, the latter being cut away to accommodate the buckets or flights as they pass about the same. The transverse partition, in order to obtain the best operative effects and proper accommodation of the connected buckets or flights, is arranged off-center with respect to the diameter of the casing, in a chord of an arc of such casing when the latter is of circular form.

With the above and other objects in view and with the above and other features employed in its practice, the invention consists in the novel provision, construction, combination, association and relative arrangement of parts, members and features hereinafter described, shown in the drawing and finally pointed out in claims.

In the drawing:—Figure 1 is a top plan view of the principal features of a pump constituted according to the invention; Fig. 2 is a longitudinal or vertical transverse sectional view of the same, taken upon the line 2—2, Fig. 1, and looking in the direction of the appended arrows; Fig. 3 is a partial side elevation of the pump construction shown in Figs. 1 and 2; Fig. 4 is a transverse sectional view, taken upon the line 4—4, Fig. 2, and looking in the direction of the appended arrows; and, Fig. 5 is an isometric view of a detail of the provision shown in the other figures.

Corresponding parts in all the figures are denoted by the same reference characters.

Referring with particularity to the drawing, the improved pump comprises a plurality of buckets or flights A, which are flexibly connected and traverse a path which extends about two spaced rotary supporting elements, B and C, respectively, the latter being arranged respectively adjacent to the end portions of a cylindrical casing D adapted for installation in the well; the casing D being provided adjacent to its upper end with a lateral discharge opening *d*. The buckets or flights A are mounted upon a flexible conveyer E, and the operative condition of said conveyer, with respect to the tension imposed thereon, as affecting the paths of ascent and descent of the buckets or flights through the casing D, is controlled by adjusting means F, applied to one of the rotary supporting elements, as B. The paths of ascent and descent of the buckets or flights are separated by a flat transverse partition G, which extends longitudinally or vertically of the casing D and subdivides the interior thereof into ascending and descending chambers, *a* and *b*, respectively.

The partition G is arranged off-center by adjusting means F, applied to one of the center thereof, and the casing D is preferably cylindrical or circular in form, as shown, whereby it may be fitted within well casings of standard circular form, such as designated at H. The buckets or flights A are formed segmental in shape with curved or arc-shaped outer edges and straight inner edges or chords to fit the walls of the ascending chamber *a*, which, when the casing D is circular in form, is segmental; and the segmental form of bucket or flight is clearly shown in Fig. 4. The close fit of the segmental buckets or flights within the cham-

ber *a*, during the ascent of the former, prevents the escape of any material portion of the liquid being raised. The descending chamber *b* is of larger transverse dimensions than the chamber *a*, permitting the buckets or flights to descend free from frictional contact with the walls thereof.

The axes of the rotary elements B and C are preferably arranged in the plane of the projected diameter of the casing D parallel with the partition G, and the partition is set off center or spaced to the rear of the plane of such diameter to such predetermined extent as shall cause the chords or straight portions of the buckets or flights between the flexible conveyer and said partition to closely engage with said partition in the upward movement of the buckets or flights, and the curved portions or arcs of the buckets or flights between the flexible conveyer and the wall of the casing D to closely engage said wall in either the upward or downward movement of the buckets or flights.

To accommodate the buckets or flights as they pass about the rotary elements B and C, said rotary elements are formed to receive the portions of the buckets or flights, which are next adjacent to the partition G in the traverse of the chambers *a* and *b* by the buckets or flights. To that end, the rotary elements B and C comprise sprocket wheels, two sprocket wheels 6 being included within the rotary element B, and two sprocket wheels 7 being included within the rotary element C. The sprocket wheels 6 and 7 are preferably cut away to form pockets 8, radially of the sprocket wheels; and said sprockets receive and accommodate the portions 9 of the buckets or flights which are directly presented to the sprocket wheels as the buckets or flights pass about the latter. Such portions 9 of the buckets or flights, are of lesser length than a radius of any of the sprocket wheels 6 and 7, to the end that the pockets 8 may be of the least possible depth; and the eccentric arrangement of the partition G within the casing D follows from such proportioning of the pockets 8, the rotary elements B and C being centered within the plane of a diameter of the casing D parallel to but out of line with the partition G, as above stated.

The pair of sprocket wheels 6 of the rotary element B are fixed to a shaft 10, which is suitably journaled in bearings 11 slidably mounted in ways 12 at the upper end of the casing D; and adjusting hand screws 13 are applied to the bearings 11, constituting therewith the adjusting means F for regulating the flexible conveyer E and its buckets or flights A with respect to the operative condition of the same, whereby the proper tension or tautness of the conveyer and buckets or flights may be obtained.

The sprocket wheels 7 of the rotary element C are fixed to a shaft 14, which extends transversely of the casing D at the lower end thereof, being journaled in bearing plates 15 secured to the casing over cut-out portions 16 within which the shaft 14 rotates.

The sprocket wheels 6 are spaced apart similarly to, and located in spaced planes longitudinally of the casing D with, the sprocket wheels 7; and the flexible conveyer E comprises two link belts 17, each of which is trained over one of the sprocket wheels 6 and a corresponding sprocket wheel 7.

K designates connection means whereby each of the bucket plates 18 is secured to both of the link belts 17; and said connection means preferably consists of a separate plate 19 formed on or connected with a separate link, as 20, of one of the link belts 17; and lying in a plane at right angles with the longitudinal plane of the link; there being two such plates 19 for each bucket plate 18, and respectively connected with or formed upon the respective link belts 17. Two suitable openings 21 are formed in the bucket plate 18 to accommodate the links 20 carrying the plates 19, whereby each link belt passes directly through each bucket-plate 18; and each plate 19 is fitted against one surface portion of the respective bucket plate 18 and rigidly connected therewith, as by bolts or screws 22; the plates 19 and the bolts or screws 22 constituting the connection means K. It results from the above that the two link belts are connected with each bucket or flight A at spaced points, insuring positiveness of support and actuation of the buckets or flights and a maintenance of the latter in proper alinement.

The bucket plates 18 being segmental in plan view as seen in Fig. 4, are bounded by a chord or straight edge and an arc or curved edge; and the latter fits within the wall of the casing in either chamber *a* or *b*, while the chord fits against the partition only in the ascending chamber *a*. It follows therefore that the width of the bucket (*i*, *e*., across its widest part at right angles to its chord) is less than a radius of the casing, while the greatest length of the bucket (*i*. *e*., along its chord) is slightly less than the diameter of the casing. In other words, it has no dimension as great as the interior diameter of the casing and would be loose therein if the partition were not arranged off-center, but this arrangement causes the bucket by its shape to fit closely in the ascending chamber as stated.

In order that the buckets on the ascending side of the belt or belts will not tip or tilt under the weight of the water being elevated, I have located the connections K laterally nearer their straight than their curved edges or about in the center of grav-

ity of their segmental lifting area, and I have located the two connections of each bucket longitudinally near its ends so that it cannot tilt in that direction.

The pockets 8 in the sprocket wheels 6 and 7 are properly spaced apart in each sprocket wheel with relation to the relative spacing of the buckets or flights A, whereby the latter pass unobstructed and properly accommodated about the sprocket wheels.

The operation, method of use and advantages of the improved pump constituting the invention, will be readily understood from the foregoing description taken in connection with the accompanying drawing and the following statement:—With the casing D installed in a well or the casing thereof, and with the conveyer E of sufficient proportions to cause the buckets or flights A to enter the liquid in the lower portion thereof, the conveyer and its buckets or flights being actuated to move in the direction designated by the arrow at the top of Fig. 2, the liquid will be raised within the chamber *a* and ejected through the discharge opening *d*. Because of the eccentric arrangement of the partition G with respect to a diameter of the casing D, such eccentric arrangement being in proportion with the limitation of radial depth of the pockets 8, the buckets or flights will closely fit against the surrounding walls of the chamber *a* in the ascent of the buckets or flights, preventing the escape and descent of any material quantity of the liquid. In the descent of the buckets or flights, the same traverse freely the chamber *b* without retardation or material friction. As the buckets or flights pass about the sprocket wheels 6 and 7 of the rotary elements B and C, the inwardly directed portions 9 of the former enter and are accommodated by the pockets 8, permitting unobstructed and unopposed movement of the buckets or flights during these phases of their travel.

The adjusting means F permit the maintenance of proper working conditions of the conveyer E and the buckets or flights connected therewith.

The particular means K whereby the buckets or flights are connected with both link belts 17 of the conveyer E, insure a positiveness and firmness of attachment, as well as facility of assembling and disconnection. Furthermore, such means K, because of the direct connection of each plate 19 with one of the links 20 of the respective link belts 17, insures a firmness of connection of the respective bucket or flight with the respective link belt, in unyielding relation. Such means K are also of simple and inexpensive character. The means K also provide for the passage of the two link belts through each of the buckets or flights, insuring a more compact and self-contained constructive result, than obtainable when the marginal or peripheral connection of the bucket or flight with the conveyer or conveyers is employed.

The entire apparatus is simple in construction and not liable to get out of repair, insuring the possibility of long continued use and operation, without interruption due to breakage or deterioration.

I do not desire to be understood as limiting myself to the specific provision, construction, combination, association and relative arrangement of parts, members and features shown and described; but reserve the right to vary the same in adapting the improvements to varying conditions of use, without departing from the spirit of the invention, or the terms of the following claims.

Having thus described my invention, I claim and desire to secure by Letters Patent:—

1. In an improved pump, a cylindrical casing provided with a flat partition extending longitudinally thereof and arranged off its diameter so as to form chambers of varied dimensions; and a conveyer provided with a segmental bucket or flight adapted to traverse said chambers.

2. In an improved pump, a cylindrical casing provided with a flat partition extending longitudinally thereof and arranged off its diameter so as to form chambers of varied dimensions; and a conveyer provided with a segmental bucket or flight adapted to traverse said chambers; said bucket or flight closely fitting against the wall of the casing and said partition which together form one of said chambers.

3. In an improved pump, a cylindrical casing provided with a flat longitudinal partition arranged off its diameter whereby two chambers of varied dimensions are provided, shafts across the diameter of the casing parallel with said partition, wheels thereon, a belt trained over the wheels and arranged to traverse both of said chambers at equal distances from the walls of said casing, and segmental buckets or flights connected with said belt and closely fitting the smaller chamber in their passage therethrough.

4. In an improved pump, a cylindrical casing provided with a flat partition extending longitudinally and standing on a chord thereof forming chambers of varied dimensions; and a conveyer provided with a segmental bucket or flight adapted to traverse said chambers; said bucket or flight closely fitting the walls of one of said chambers.

5. In an improved pump, a cylindrical casing provided with a flat longitudinal partition standing on a chord of the casing whereby two chambers of varied dimensions are provided within said casing, spaced sprocket wheels, a link belt trained about

said sprocket wheels and arranged to traverse both of said chambers of said casing, and a segmental bucket or flight connected with said link belt and closely fitting the smaller of said chambers in the passage of the same therethrough; said sprocket wheels being each provided with a radial pocket arranged to receive and accommodate a portion of said bucket or flight in the passage of the latter about said sprocket wheels.

6. In an improved pump, a link belt, and a bucket or flight consisting of a solid plate having an opening therethrough; combined with connection means comprising a plate rigid with a link between its ends and at right angles to its length and of a size to lie flat upon the bucket-plate and over said opening when the link passes through it, and bolts or screws passing through the plate and bucket-plate and securing said link to the bucket-plate.

7. In an improved pump, a bucket or flight consisting of a plate of segmental shape having an opening nearer its chord than its curved edge; combined with a link belt of which one link extends through said opening, and connection means between said link and bucket.

8. In an improved pump, a bucket or flight consisting of a plate of segmental shape having openings nearer its chord than its curved edge and respectively near its ends; combined with parallel link belts of which like links in each extend through said openings, and connection means between the links and bucket.

9. In an improved pump, the combination with buckets or flights, each consisting of a plate of segmental shape with its greatest width less than a radius of the circle on which its curved edge is struck; of an upright belt, and connection means between it and each bucket located nearer its chord than the extremity of its curved edge.

10. In an improved pump, the combination with buckets or flights, each consisting of a plate of segmental shape with its greatest width less than a radius of the circle on which its curved edge is struck; of parallel upright belts, and connection means between them and the buckets located nearer the chord of each plate than the extremity of its curved edge and at points near the ends of said chord.

11. In an improved pump, the combination with buckets or flights, each of segmental shape with its greatest length less than a diameter of the circle on which the curved edge is struck; of a casing having a chamber shaped to fit said buckets, and a belt moving through said chamber and connected with the buckets.

12. In an improved pump, the combination with buckets or flights, each of segmental shape with its greatest length less than a diameter of the circle on which the curved edge is struck and its greatest width less than a radius of said circle; of a casing having a chamber adapted to fit said buckets and a second chamber wider than their greatest width, and a belt moving through said chambers and connected with the buckets.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM H. W. HAMILTON.

Witnesses:

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