

G. L. STEARNS.  
POWER HEAD.

(Application filed Apr. 23, 1900.)

(No Model.)

2 Sheets—Sheet I.

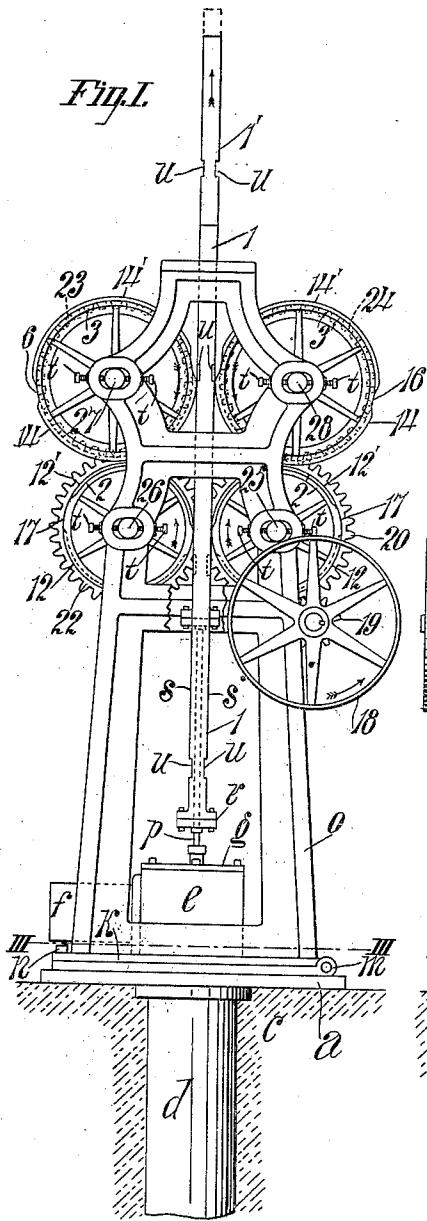


Fig. I.

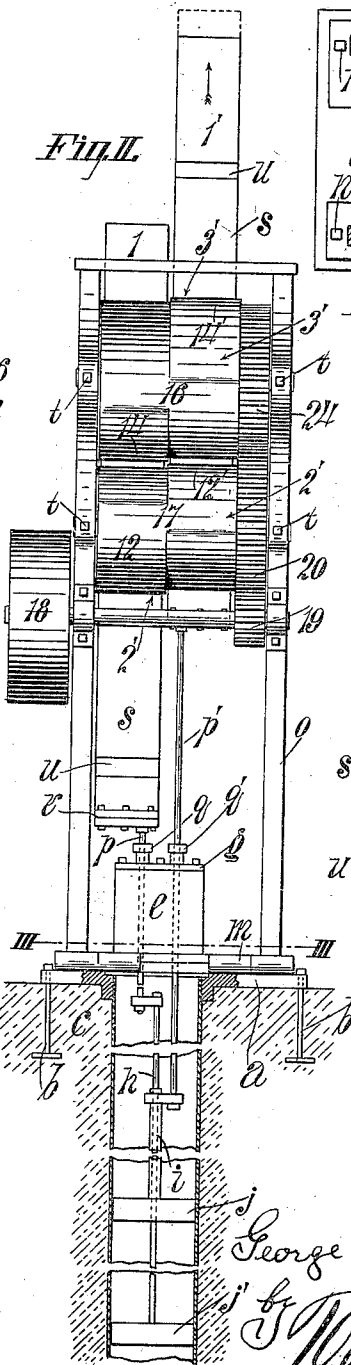


Fig. II.

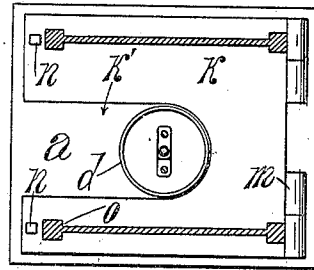
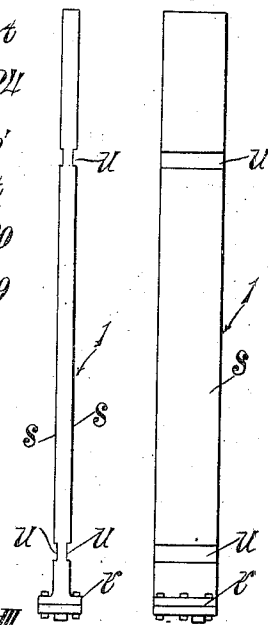


Fig. III.

Fig. IV. Fig. V.



Witnesses  
 David Kingman.  
 J. Townsend.

George Leppere Stearns  
 by Townsend Bro.  
 his atty

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Fig. VI.

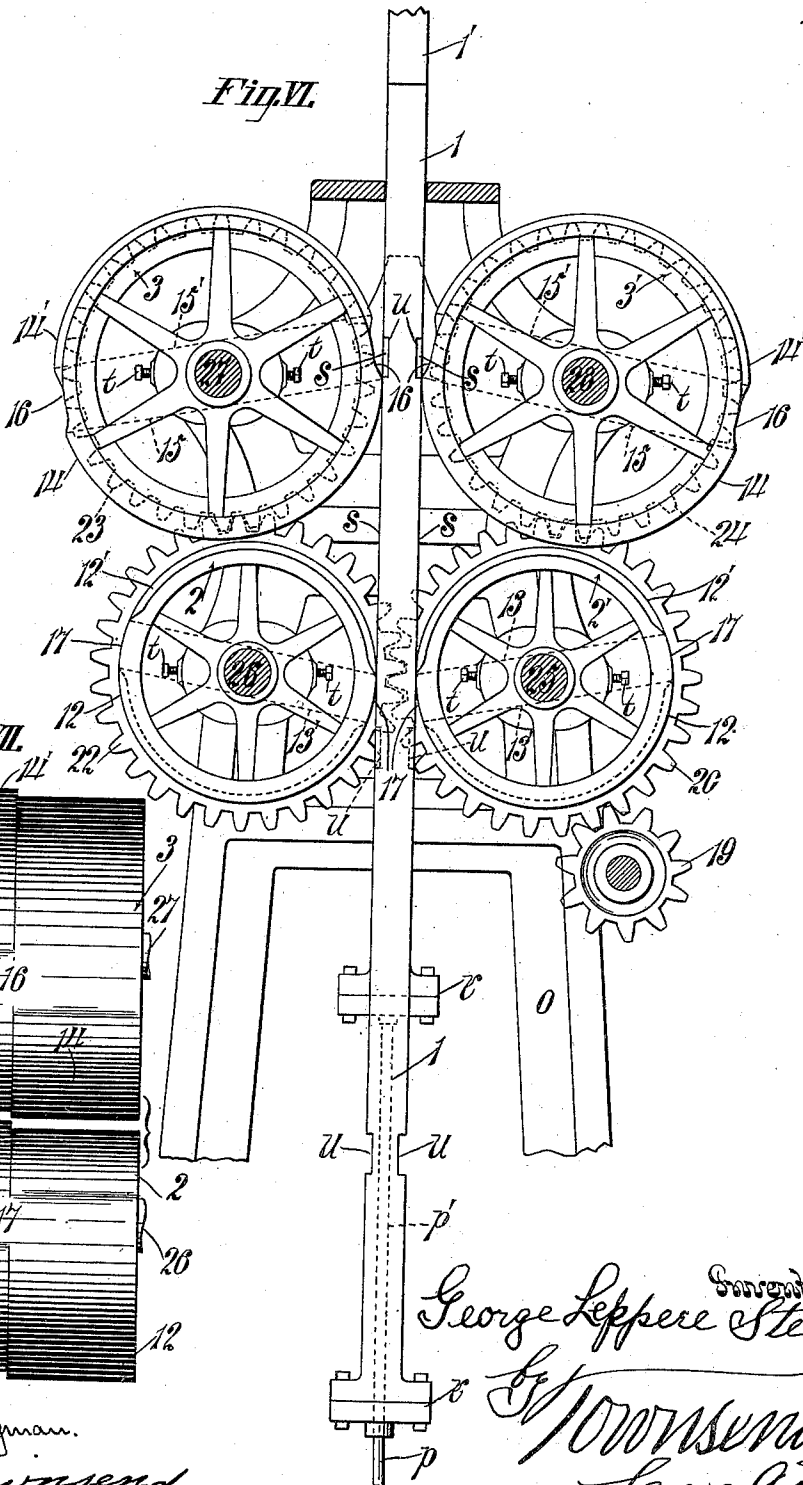
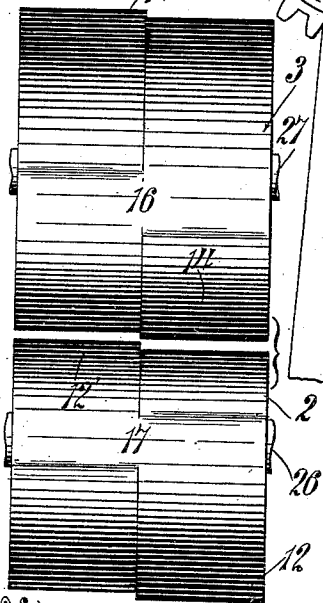


Fig. VII.



Witnesses  
 Perry Kingman.  
 J. Townsend.

George Leppere Stearns  
 his atty.  
 Townsend Bros

# UNITED STATES PATENT OFFICE.

GEORGE LEPPER STEARNS, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF  
ONE-HALF TO PRESTON KING WOOD, OF SAME PLACE.

## POWER-HEAD.

SPECIFICATION forming part of Letters Patent No. 684,591, dated October 15, 1901.

Application filed April 23, 1900. Serial No. 14,037. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE LEPPER STEARNS, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Power-Head; of which the following is a specification.

This invention relates to a power-head for operating a pump-rod by a friction-piston driven by a plurality of pairs of mutilated friction-rollers.

An object of this invention is to provide superior means for operating a single or double piston pump.

It is an object of my invention to prevent the friction-piston from creeping, so that the rollers will not throw the piston too far in either direction, and the operation of the machine will automatically bring the friction-pistons to the proper adjustment for the required stroke.

Another object of my invention is to operate the piston positively both upward and downward and to catch the piston and drive it downward after the upward motion ceases.

Another object is to carry the pump-piston down at a high speed and to carry it up at a lower speed, so that in double-piston pumps the upward stroke of the one piston will begin before the upward stroke of the other piston ceases, whereby a constant upward flow of water can be maintained, so that the inertia of the water needs to be overcome but once.

In order to make such an arrangement of the rollers practicable and also to prevent creeping of the friction-piston in any instance, I furnish the friction-pistons with friction-faces of a definite length, and at each end of such face the piston is cut away or otherwise offset, so that when the peripheral friction-faces of the mutilated rollers come to such offsets the piston will no longer be gripped by the friction-rollers. The friction-pistons are driven by two pairs of rollers, the gripping-faces of which are substantially the same length, but preferably the radii of the gripping-faces on the pair of rollers which carry the piston down will be of greater length than the radii of the gripping-faces of the rollers which carry the piston up. The upper limit-

ing offsets of the friction-faces of the piston are located just above the point to be gripped by the upper rollers when the piston is at the lowest limit of its stroke and the lower offsets are located just below the point to be gripped by the lower rollers when the piston is at the upper limit of its stroke.

In this invention the power-head is so arranged as to allow the pistons to be detached and the machinery to be readily thrown back out of the way, so that the pump-rods can be readily pulled for the purposes of repair and cleaning.

My invention includes the combination of a friction-piston furnished with oppositely-arranged friction-faces of equal length, four mutilated rollers arranged in two pairs, the rollers of one pair being respectively on the opposite sides of the piston and each furnished with a gripping-face, which is a cylinder-segment of more than one hundred and eighty degrees, and the rollers of the other pair being respectively on opposite sides of the piston and each furnished with a gripping-face of a length less than, but nearly equal to, that of the gripping-face on a roller of the first-named pair of rollers and being a cylinder-segment of less than one hundred and eighty degrees, means for rotating the rollers of one pair to cause the gripping-faces thereof to intermittently throw the piston in one direction, and means for rotating the rollers of the other pair at the same speed as the first-named pair of rollers to cause the gripping-faces thereof to intermittently throw the piston in the other direction.

In order to operate a double-piston pump so as to throw the water upward in a continuous stream, I provide two friction-pistons of the character above described and the four mutilated rollers arranged in two pairs, the rollers of one pair being in a horizontal plane and respectively on opposite sides of the friction-pistons and furnished with gripping-faces for said pistons, respectively, said gripping-faces being respectively cylinder-segments of more than one hundred and eighty degrees, the chords of the segmental gripping-faces of each roller of said pair being on opposite sides of the axis of said roller, the other two rollers being arranged in a pair

above the first-mentioned pair of rollers and on opposite sides of said pistons and respectively furnished with gripping-faces for the pistons, respectively, each of said faces being  
 5 a cylinder-segment of a length less than, but nearly equal to, either of the segmental gripping-faces of the first-named pair of rollers and less than one hundred and eighty degrees, the chords of the segment-faces of each roller  
 10 being on opposite sides of the axis of said roller; a double-piston pump, one of the pistons of said pump being connected with one of said friction-pistons and the other piston of the pump being connected with the other  
 15 friction-piston; means for continuously rotating one pair of rollers synchronously to cause the gripping-faces thereof to intermittently and alternately throw the pistons in one direction, and means for rotating the  
 20 other pair of rollers at the same speed as the first-named pair of rollers to cause the gripping-faces thereof to intermittently return the pistons in the other direction. In this construction the rollers of the two pairs of  
 25 mutilated rollers are operatively connected together, and the operative connections are arranged to synchronously rotate the upper and larger pair of rollers inward and downward and the lower and smaller rollers inward  
 30 and upward, so that whenever the upper pair of rollers grip the piston to carry such piston down the other piston will be gripped by the lower pair of rollers, which will be moving said other piston up, so that the two  
 35 pistons serve as counterbalances for each other whenever they are simultaneously gripped, one by the upthrust-rollers and the other by the downthrust-rollers. The object of this arrangement is to avoid any dead lift  
 40 in any piston except at the beginning of the upward stroke, at which moment both pistons simultaneously move upward. A further object of the arrangement just mentioned is to cause each piston to travel downward at a  
 45 higher rate of speed than it travels upward. Each of the two gripping-faces of each of the upthrust-rollers extends more than half-way around the roller, so that when two gripping-faces of the upthrust-rollers have engaged  
 50 their piston to throw it up they will not let go of such piston until the other two gripping-faces of the same rollers have caught the other piston to throw it up, and consequently there will be a moment at the beginning of  
 55 each upward stroke of each piston when both pistons are moving up at the same speed, and the lower pair of rollers will at that moment be carrying both of the pistons. The gripping-faces of each of the downthrust-rollers are arranged on opposite sides of their  
 60 respective rollers. Since they are each of less than one hundred and eighty degrees, neither extends half-way around the roller and there remains two oppositely-disposed non-gripping spaces on the large upper downthrust-rollers, and there will be a time in the rota-

tion of said rollers when the friction-pistons are not engaged by the gripping-faces of the downthrust-rollers. The two pairs of rollers are so arranged that when both of the pistons  
 70 are gripped by the upthrust-rollers they will both be free from the gripping-faces of the downthrust-rollers, thus leaving the pistons free to move up together at the close and beginning of each stroke.  
 75

The invention is capable of being carried out in various forms, and comprises the machine, combinations, and parts hereinafter described and claimed, and illustrated in the  
 80 accompanying drawings, in which—

Figure I shows my newly-invented power-head arranged for operating a double-piston pump. This view is an elevation looking at the ends of the rollers. Fig. II is an elevation showing said power-head as viewed at  
 85 the right side of Fig. I. In Figs. I and II a fragment of a double-piston pump is also shown. Fig. III is a plan on line III III, Figs. I and II. Fig. IV is an edge view of the friction-piston detached. Fig. V is a face view  
 90 of the friction-piston detached. Fig. VI is a detail, on a larger scale, to show the construction and arrangement of the mutilated friction-rollers. In Figs. I, II, and VI one of the friction-pistons is shown at the lowest limit of  
 95 its stroke, and the upthrust-rollers are just ready to begin to lift said piston on the upstroke, while the downthrust-rollers have just released said piston and have not yet gripped the other piston. The further upward movement of said other piston is indicated by dotted lines in Figs. I and II. Fig. VII is a detail of the faces of an upper and a lower roller.

In the drawings, *a* indicates an anchored bed-plate to be anchored by anchors *b* in a  
 105 concrete bed or any other foundation *c*.

*d* indicates a pump-stock which has a head *e*, provided with a spout *f*.

*g* indicates a removable top plate for the pump-head *e*.  
 110

*h* indicates a pump-rod playing in a tubular pump-rod *i*. The two pump-rods operate two suckers *j j'* of the double-piston pump.

*k* indicates the frame-base, hinged on a horizontal axis by a hinge *m* at one side to  
 115 the bed-plate *a*.

*n* indicates bolts at the other side of the frame-base to hold the frame-base down on the bed-plate *a*.

*o* indicates the frame, carried by the frame-  
 120 base *k* and which frame carries the power-head mechanism. The power-head mechanism shown comprises two friction-pistons or reciprocating members *1 1'*, both of which are

driven by two pairs of mutilated rollers *2 2'*  
 125 and *3 3'*. The friction-pistons *1 1'* are respectively connected by connecting-rods *p p'* with the pump-rods *h i*. The pump-rod *i* is a tubular rod through which the pump-rod *h*

passes, and the two pump-rods are connected  
 130 with the two pump-suckers *j j'*. The connecting-rods *p p'* are detachably connected with

their respective friction-pistons 1 and 1' and respectively pass through stuffing-boxes  $q$   $q'$  in the removable head  $g$ .

5  $r$  indicates the detachable connections between the friction-pistons and the piston-rods. The purpose of the hinged frame-base  $k$  and the detachable parts above specified is to allow the operative mechanism of the power-head to be detached from the pump-rods and  
10 the power-head frame and its mechanism to be thrown back from above the pump-head, thus to give access to the pump for the purpose of drawing the pump-rods.

15  $k'$  indicates a slot or opening through the frame-base  $k$  to allow the same to be thrown back without interfering with the spout  $f$  and head  $e$ .

12 12' indicate the two gripping-faces on each of the upthrust-rollers.

20 14 14' indicate the two gripping-faces on each of the downthrust-rollers.

16 indicates the portions of the downthrust-rollers which are devoid of any gripping-face from end to end of the roller.

25 17 indicates the portions of the upthrust-rollers, respectively provided with gripping-faces from end to end of the roller. The chords of the segmental faces of each of the rollers are parallel and are on opposite sides  
30 of the axis of said rollers. The chord of the segmental face 12, which chord is indicated by the dotted line 13, is on the side of the axis of the roller 2 which is opposite the main body of said segmental face 12, and the chord  
35 13' of the segmental face 12' is parallel with the chord 13 and on the opposite sides of the axis of the roller. The chords 15 and 15' of the segmental faces 14 are on opposite sides  
40 of the axis from each other and on the same side with their respective faces.

18 indicates a pulley connected with a pinion 19, which meshes with a cog-wheel 20. Cog-wheels 20, 22, 23, and 24, of equal radius,  
45 are mounted, respectively, on the axles 25, 26, 27, and 28 of the rollers 2', 2, 3, and 3', respectively. The cog-wheels 20 22 of the upthrust-rollers mesh with each other. The cog-wheel 20 also meshes with the cog-wheel  
50 24 of one of the downthrust-rollers, and the cog-wheel 22 meshes with the cog-wheel 23 of the other downthrust-roller. By this means all the rollers are simultaneously driven at  
55 the same speed of rotation, the upthrust-rollers to throw the pistons up alternately and the downthrust-rollers to throw the pistons down alternately. The width of either vacant space 16 between the ends of the gripping-faces of the downthrust-rollers slightly exceeds the width of either longitudinally-continuous gripping-face 17 of the upthrust-rollers,  
60 so that at the portion of the stroke when both friction-pistons are gripped by the upthrust-rollers—*i. e.*, at the beginning and close of each upstroke—they will both be free from the downthrust-rollers. The length of each  
65 of the upthrust gripping-faces 12 12' is equal to the length of the desired stroke, and the

length of each of the downthrust gripping-faces is a fraction less than the desired stroke, and the rollers are arranged so that each friction-piston is free an instant before the downthrust-rollers grip it, thus to avoid any danger of locking. The friction-faces  $s$  of the friction-pistons are each equal in length to the length of stroke plus the distance between  
70 the horizontal planes in which the axes of the upthrust and downthrust rollers lie.

$t$  indicates adjusting-screws for adjusting the shafts or axles 25 26 27 28 to bring the rollers toward and from the reciprocating member or friction-piston 1 1'. The rollers  
80 are to be set so as to cause the corresponding gripping peripheral faces, as 12 and 12, 12' and 12', 14 and 14, or 14' and 14', to simultaneously positively engage the opposite faces  
85 of the reciprocating member, so that when the rollers are rotated the reciprocating member will be appropriately gripped by and released from the peripheral gripping-faces. The four cog-wheels are arranged substantially  
90 in a quadrangular train—that is to say, the effect of the cog-wheels meshed as shown is substantially the same as if the cog-wheels were meshed with each other in a quadrangular train; but by reason of the greater radius  
95 of the downthrust-rollers and the necessity of having cog-wheels of a uniform radius, so that the action of the peripheral faces relative to the reciprocating member or piston will be perfectly true, the upper wheels of  
100 the train are necessarily too far apart to mesh with each other. The limits of the friction-faces of the reciprocating members or pistons 1 1' are shown in the drawings as being formed by transverse notches or grooves  $u$ .  
105 By reason of these limits the position of the pistons at the beginning of a stroke is immaterial. Both pistons may at starting be at the lower end of their stroke; but in that position the upper notches of the pistons will  
110 be at the gripping plane of the downthrust-rollers, and therefore the gripping-faces of the downthrust-rollers have no effect upon either of the pistons until one of the pistons has been carried almost to its upper limit.  
115 Then the other piston will be gripped by the upthrust-rollers and the machine will be in full operation.

What I claim, and desire to secure by Letters Patent of the United States, is— 120

1. The combination of a friction-piston furnished with oppositely-arranged friction-faces of equal length; four mutilated rollers arranged in two pairs, the rollers of one pair being respectively on opposite sides of the piston and each furnished with a gripping-face which is a cylinder-segment of more than one hundred and eighty degrees, and the rollers of the other pair being respectively on opposite sides of the piston and each furnished with a gripping-face of a length less  
125 but nearly equal to that of the gripping-face on a roller of the first-named pair of rollers and being a cylinder-segment of less than  
130

one hundred and eighty degrees; means for rotating the rollers of one pair to cause the gripping-faces thereof to intermittently throw the piston in one direction; and means for rotating the rollers of the other pair at the same speed to cause the gripping-faces thereof to intermittently throw the piston in the other direction.

2. The combination of a friction-piston provided with oppositely-arranged friction-faces of equal length; four mutilated rollers arranged in two pairs, the rollers of one pair being respectively on opposite sides of the piston and each provided with a gripping-face which is a cylinder-segment of more than one hundred and eighty degrees, and the rollers of the other pair being respectively on opposite sides of the piston and each furnished with a gripping-face of a length slightly less, but nearly equal to that of the gripping-face on a roller of the first-named pair of rollers and being a cylinder-segment of less than one hundred and eighty degrees, cog-wheels of equal diameter mounted respectively on the rollers of the first-named pair and meshing with each other; a cog-wheel on one of the rollers of the second-named pair of rollers and meshing with the cog-wheel of the roller which is on the same side of the piston therewith; another cog-wheel mounted on the other roller of said second pair and meshing with the cog-wheel of the other roller of the first-named pair; and means for driving the rollers.

3. The combination of two friction-pistons respectively furnished with oppositely-arranged friction-faces of equal length; a pair of mutilated rollers, the rollers of said pair being respectively on the opposite sides of said pistons and furnished with gripping-faces for said pistons respectively, said gripping-faces being respectively cylinder-segments of more than one hundred and eighty degrees; the chords of the segmental gripping-faces of each roller being on opposite sides of the axis of said roller; a second pair of mutilated rollers arranged on opposite sides of said pistons and respectively furnished with gripping-faces for the pistons respectively, each of said faces being a cylinder-segment of a length less than but nearly equal to either of the segmental gripping-faces of the first-named pair of rollers and of less than one hundred and eighty degrees, the chords of the segment-faces of each roller being on opposite sides of the axis of said rollers; a double-piston pump, one of the pistons of said pump being connected with one of said friction-pistons and the other piston of the pump being connected with the other friction-piston; means for rotating one pair of rollers synchronously to cause the gripping-faces thereof to intermittently and alternately throw the pistons in one direction; and means for ro-

tating the other pair of rollers at the same speed as the first-named pair of rollers, to cause the gripping-faces thereof to intermittently and alternately throw the pistons in the other direction.

4. The combination of a friction-piston; a pair of mutilated rollers journaled parallel with each other and arranged to grip the friction-piston between their peripheral faces; means for simultaneously rotating the rollers in one direction to cause the outer portions of their peripheries to grip and release the friction-piston to throw it in one direction and allow its return; a second pair of mutilated rollers arranged in the same manner as the first-mentioned rollers; and means for rotating said second rollers in the direction opposite that of the first-mentioned rollers to grip the friction-piston when it is released by the first-mentioned rollers, and vice versa, whereby the friction-piston is alternately driven in one and the other direction.

5. The combination of a friction-piston; two mutilated rollers arranged with their axes in a plane which is at right angles to the path of the friction-piston and to grip said piston between their outermost peripheries; two other rollers arranged with their axes in a plane parallel with the plane of the axes of the said first-named rollers to grip said piston between their outer peripheries when the first-named rollers release said piston; four cog-wheels substantially in a quadrangular train and connected with the rollers respectively; and means for rotating said cog-wheels and rollers.

6. The combination with a plurality of pairs of mutilated rollers, of a friction-piston between said rollers to be gripped by the gripping peripheral faces of the rollers, and having frictional faces to be gripped by said peripheral faces and limited to determine the length of stroke.

7. A power-head comprising a plurality of pairs of mutilated rollers, each of which rollers is furnished with two peripheral gripping-faces which are arranged at opposite sides and opposite ends of their rollers respectively; two friction-pistons between said rollers to be alternately gripped and released by the one pair of rollers and at the same time released and gripped by the other pair of rollers; and means for rotating the one pair of rollers in one direction and the other pair of rollers in the other direction.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, at Los Angeles, California, this 11th day of April, 1900.

GEORGE LEPPER STEARNS.

Witnesses:

JAMES R. TOWNSEND,  
FRANCIS M. TOWNSEND.