

(No Model.)

2 Sheets—Sheet 1.

S. M. FULTON & A. T. AMES.  
PUMP POWER.

No. 571,086.

Patented Nov. 10, 1896.

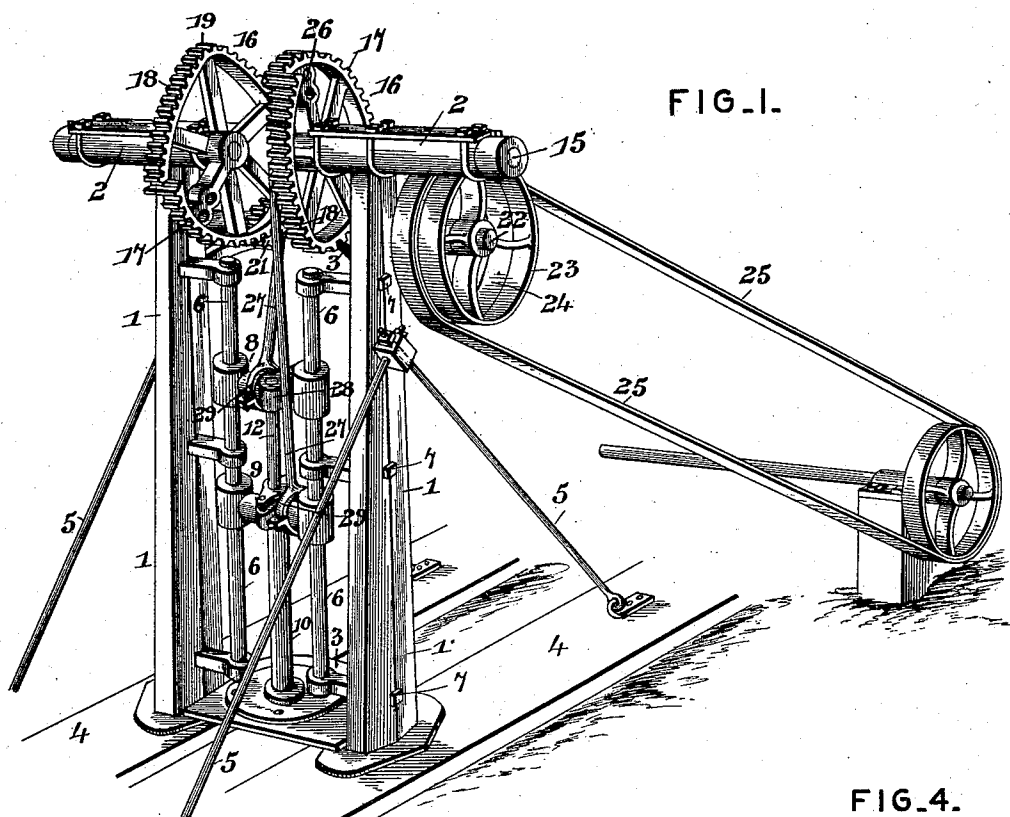


FIG. 3.

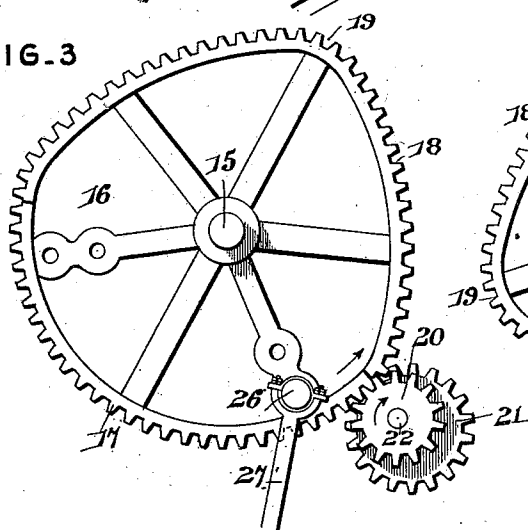
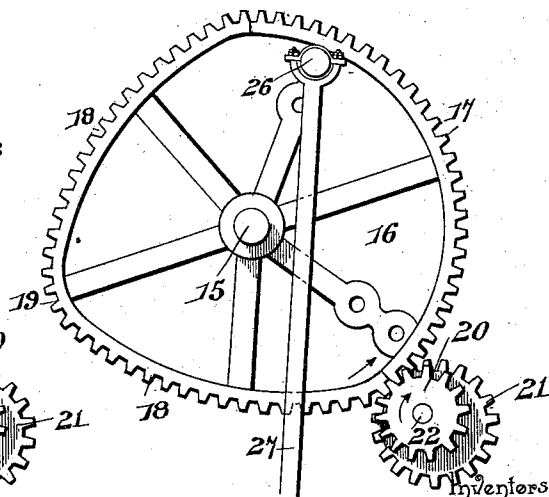


FIG. 4.



Witnesses  
Jas. S. McArthur  
U. B. Hillyard.

Samuel M. Fulton  
Alden T. Ames  
By their Attorneys,  
C. A. Snow & Co.

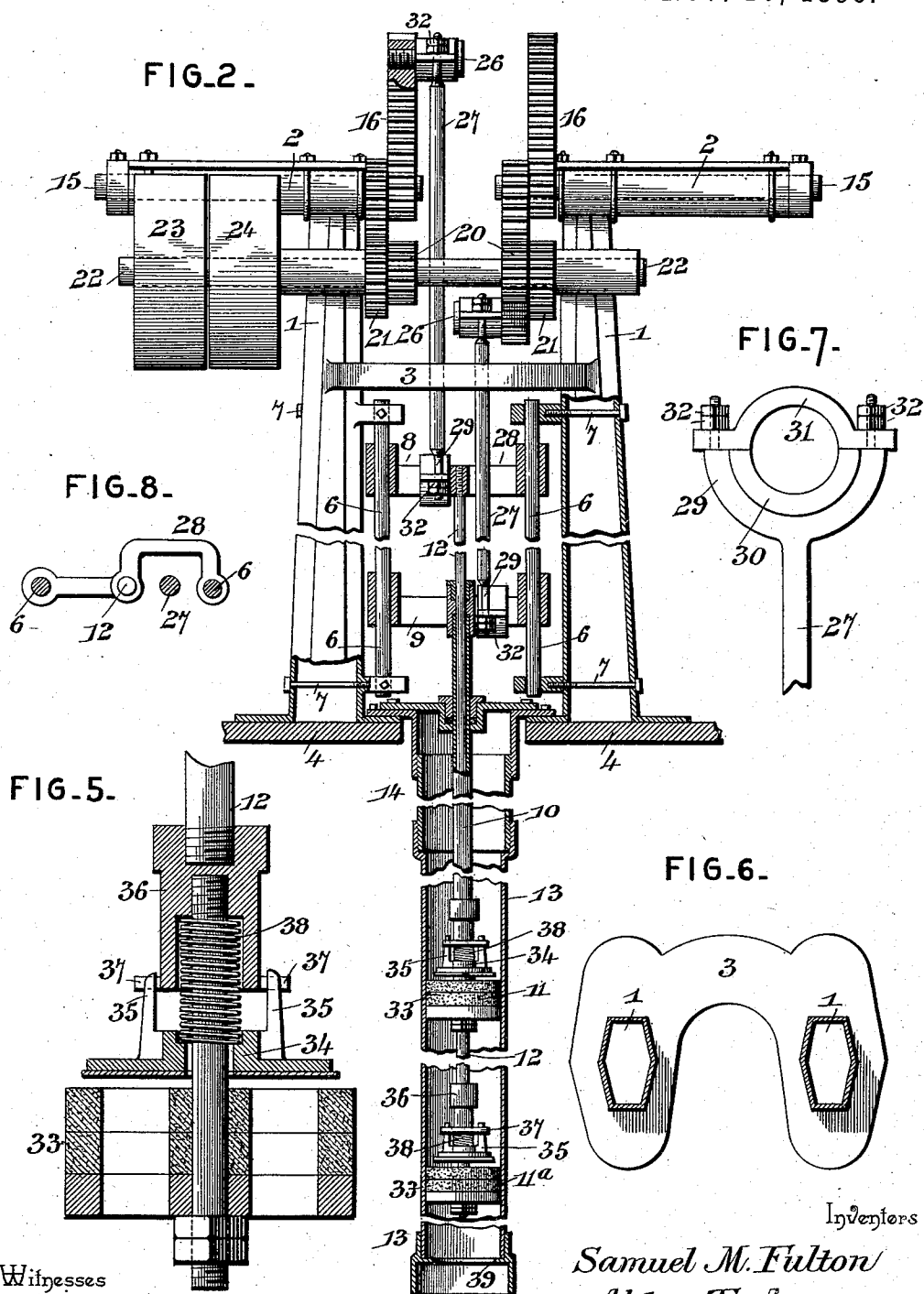
(No Model.)

2 Sheets—Sheet 2.

S. M. FULTON & A. T. AMES.  
PUMP POWER.

No. 571,086.

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Witnesses  
*Jas. K. McLaughlin*  
*U. B. Hillyard.*

Inventors  
*Samuel M. Fulton*  
*Alden T. Ames*  
By their Attorneys,  
*C. A. Snow & Co.*

# UNITED STATES PATENT OFFICE.

SAMUEL M. FULTON AND ALDEN THAYER AMES, OF GALT, CALIFORNIA.

## PUMP-POWER.

SPECIFICATION forming part of Letters Patent No. 571,086, dated November 10, 1896.

Application filed November 21, 1895. Serial No. 569,658. (No model.)

*To all whom it may concern:*

Be it known that we, SAMUEL M. FULTON and ALDEN THAYER AMES, citizens of the United States, residing at Galt, in the county of Sacramento and State of California, have invented a new and useful Pump-Power, of which the following is a specification.

This invention relates to pumps and actuating or driving gearing therefor, and has for its object to secure a steady and uniform stream and to obviate pounding and hammering and to dispose the parts so that the load will practically be uniform at all times, thereby resulting in a steady application of the motive power utilized for operating the pump.

Other objects and advantages are contemplated, and for a full understanding of the same reference is to be had to the accompanying drawings and the following description.

The improvement is susceptible of various changes in the form, proportion, and the minor details of construction without departing from the principle or sacrificing any of the advantages of the invention, and to a full disclosure of the invention an adaptation thereof is shown in the accompanying drawings, in which—

Figure 1 is a perspective view of a pump-head equipped with the improved gearing. Fig. 2 is a vertical central section thereof, showing the pump-barrel and the valved plungers operating therein. Fig. 3 is a detail view of a set of driving-gears, showing the relative disposition of the parts when the crank has just passed the lower dead-point and the plunger connected therewith is about to ascend and lift the column of water. Fig. 4 is a view similar to Fig. 3 of the companion set of gears, showing the relative disposition of the parts when the crank is approaching and about to pass the upper dead-point and the plunger in the act of completing its upward stroke. Fig. 5 is a detail view of one of the plungers. Fig. 6 is a detail view of the base portion of the head supporting the gearing. Fig. 7 is a detail view of an end portion of one of the pitmen connecting the cross-heads with their respective driving-gear. Fig. 8 is a detail view of the upper cross-head.

The same reference-numerals denote corre-

sponding and like parts in all the figures of the drawings.

The head for supporting the actuating mechanism may be of any desired and suitable construction, and as shown it comprises hollow pillars 1, provided at their upper ends with bearings 2 and connected by yokes 3. This head is secured to sills 4 and is braced by stays 5, which extend from the outer ends of the sills and connect with the pillars 1 near their upper ends. Vertically-disposed guide-rods 6 extend in parallel relation and are substantially secured to the pillars 1 by means of suitable fastenings 7, which extend through the sides of the pillars.

Cross-heads 8 and 9 have sleeves at their ends which encircle the guide-rods 6 and are directed thereby in their vertical movements. A tubular plunger or piston-rod 10 has connection with the lower cross-head 9, and is provided at its lower end with the plunger 11. A plunger-rod 12 has connection at its upper end with the cross-head 8 and is supplied at its lower end with a plunger 11<sup>a</sup>, similar in construction and operation to the plunger 11, and this rod 12 operates in and through the tubular plunger-rod 10. The plungers are disposed to move and reciprocate in the pump-barrel 13 in opposite directions, whereby a continuous stream is caused to flow through the pump-stock 14.

The driving-gears for each plunger are duplicates and are disposed in reverse order, so as to actuate the plungers in alternate and opposite directions, and a detailed description of the one will suffice to a clear and full understanding of all. A shaft 15 is mounted in each bearing 2 and is held therein against longitudinal movement, and these shafts aline and are provided at their inner ends with similar drive-gears 16, having a toothed portion 17, formed on the arc of a circle whose center corresponds with the axial line of rotation of the shafts 15 and which extends about three-eighths of the circumference of the gear-wheel, or less than half its circumferential length. The remaining portion 18 of the drive-gear is constructed so as to gradually recede from the terminals of the circular portion to a point midway between the terminals of the part 17, which

middle portion is farthest removed from the axial line of rotation of the drive-gear, as shown at 19. The part 17 will be designated as the "circular" portion of the drive-gear and the part 18 as the "cam" portion, and the parts 17 and 18 are disposed in different vertical planes, so as to mesh with the respective driving-pinions 20 and 21, secured upon a counter-shaft 22, mounted in suitable bearings of the pillars 1. This counter-shaft 22 is supplied with a loose pulley 23 and a tight pulley 24, which support the drive-belt 25, extending to and operated by means of a suitable motive power.

The drive-pinions 20 and 21 may be integrally or separately formed, but in either case they are mounted upon the counter-shaft so as to revolve simultaneously therewith. The pinion 20 is concentrically mounted with the counter-shaft and is adapted to mesh with the circular toothed portion of the drive-gear, and the pinion 21 is of larger diameter than the pinion 20 and is eccentrically mounted upon the counter-shaft and is adapted to mesh with the cam portion 18 of the drive-gear. The drive-pinions are so proportioned relatively to the drive-gears that upon the pinion 20 making two complete revolutions the drive-gear will travel a distance corresponding to the circular toothed portion 17, and upon the pinion 21 making two complete revolutions the drive-gear will move a distance corresponding to the length of the cam portion 18. Hence while the drive-pinions make four complete revolutions the drive-gears will make only a single revolution. Obviously in proportioning the parts the dimensions may be varied, but the best results are attained from the construction herein disclosed. Each drive-gear has a wrist-pin 26, which is connected by means of a pitman 27 with the respective cross-head, and in order to give clearance for and admit of the oscillatory movements of the pitman connecting the drive-gear with the lower cross-head the upper cross-head 8 is formed with an offset portion 28, as most clearly shown in Fig. 8. The pitmen are similarly constructed at their opposite ends, which ends are forked, as shown at 29, and in the fork is fitted a semi-circular bearing 30, and the fork is closed by a yoke or cap-plate 31, whose middle portion is oppositely curved and forms with the part 30 a bearing in which is journaled the wrist-pin or part of the cross-head having connection therewith, the cap-plate being held in place by binding-nuts 32, mounted upon the threaded ends of the forked branches.

The plunger or piston comprises a head 33, which is secured upon the plunger-rod, a valve 34, adapted to move upon the plunger-rod so as to close and uncover the openings in the head 33, and having vertically-extending arms 35, and a collar 36, secured upon the plunger-rod above the head 33 and having outwardly-extending lugs 37 at its lower end to receive and guide the arms 35 in the ver-

tical movements of the valve 34. A coil-spring 38 is mounted upon the plunger-rod and is confined between the collar 36 and the valve 34 and has its end portions fitted in depressions formed in the opposing sides of the said collar and valve, as most clearly indicated in Fig. 5. Inasmuch as the pump-barrel is disposed at the bottom of the well it has not been found necessary to provide the same with a foot-valve, and in order to prevent the loss or dropping of the plunger into the well should the same become accidentally detached from the plunger-rod the lower end of the pump-barrel is formed with an inwardly-extending ledge 39, which may be an integral part thereof or provided in any convenient and desired manner.

By the arrangement of the parts herein disclosed it will be seen, on reference to Figs. 3 and 4, that one wrist-pin or crank will pass the lower dead-point before the opposite wrist-pin or crank reaches the upper dead-point and before it makes its complete upward travel. Hence the lower plunger will begin its ascent before the upper plunger completes its upward stroke and begins to return to a position to again make an upward stroke. This operation results in the attainment of a steady and uniform stream and obviates the hammering and pounding of the plungers frequently experienced in water-elevating apparatus due to the passing of the plungers or pistons by the dead-points.

Having thus described the invention, what is claimed as new is—

1. In a pump having two plungers or pistons, the combination of actuating mechanism for alternately operating the plungers, the same consisting of two drive-gears, each operatively connected with a plunger and comprising a circular toothed portion of less length than half the perimetral distance and a cam toothed portion, the driving-gears being disposed so that the circular and cam portions will be disposed approximately in inverse order, and driving-pinions of different diameter, the smaller pinion being concentrically mounted upon its shaft and adapted to mesh with the circular toothed portion of the drive-gear, and the larger pinion being eccentrically mounted and arranged to mesh with the cam portion of the drive-gear, whereby in the operation of the pump the lower plunger will begin its ascent prior to the completion of the upward stroke of the upper plunger, substantially as set forth for the purpose described.

2. In a pump having two plungers or pistons, the combination of actuating mechanism for alternately operating the plungers, the same consisting of independent drive-gears, each operatively connected with its respective plunger and comprising a circular toothed portion and a cam toothed portion arranged in different relative planes, the corresponding parts of the drive-gears being disposed approximately in inverse order, and

driving-pinions secured upon a counter-shaft and of different diameters, the smaller pinions being concentrically mounted and adapted to mesh with the circular portions of the drive-gears and the larger pinions being eccentrically disposed and adapted to engage with the cam portions of the said drive-gears, the parts being proportioned and disposed so that in the operation of the pump the lower piston or plunger will take the load prior to the completion of the upward stroke of the upper plunger, substantially as set forth for the purpose specified.

3. The herein shown and described pump-power, comprising a tubular plunger-rod, a second plunger-rod operating through the tubular plunger-rod, cross-heads mounted upon guide-rods and having the plunger-rods connected therewith, the upper cross-head having an offset portion, independent drive-gears each comprising a circular and a cam toothed portion and provided with a wrist-pin, the different toothed parts of the drive-gears being in different relative planes, and the drive-gears

being arranged so that the corresponding parts will be disposed approximately in inverse order, pitmen connecting the wrist-pins of the drive-gears with the cross-heads, a counter-shaft, and driving-pinions mounted upon the counter-shaft and of different diameter, the smaller pinions being concentrically mounted and adapted to mesh with the circular portions of the drive-gears, and the larger pinions being eccentrically disposed and adapted to engage with the cam portions of the drive-gears, whereby in the operation of the pump one plunger will take the load prior to the completion of the stroke of the other plunger, substantially as set forth for the purpose described.

In testimony that we claim the foregoing as our own we have hereto affixed our signatures in the presence of two witnesses.

SAMUEL M. FULTON.

ALDEN THAYER AMES.

Witnesses:

E. H. METZNER,  
LOREN TAYLOR.