(No Model.) 2 Sheets—Sheet 1.

D. C. BURSON.

VACUUM AND FORCE PUMP.

No. 460,944. Patented Oct. 13, 1891.

Fig. 1.

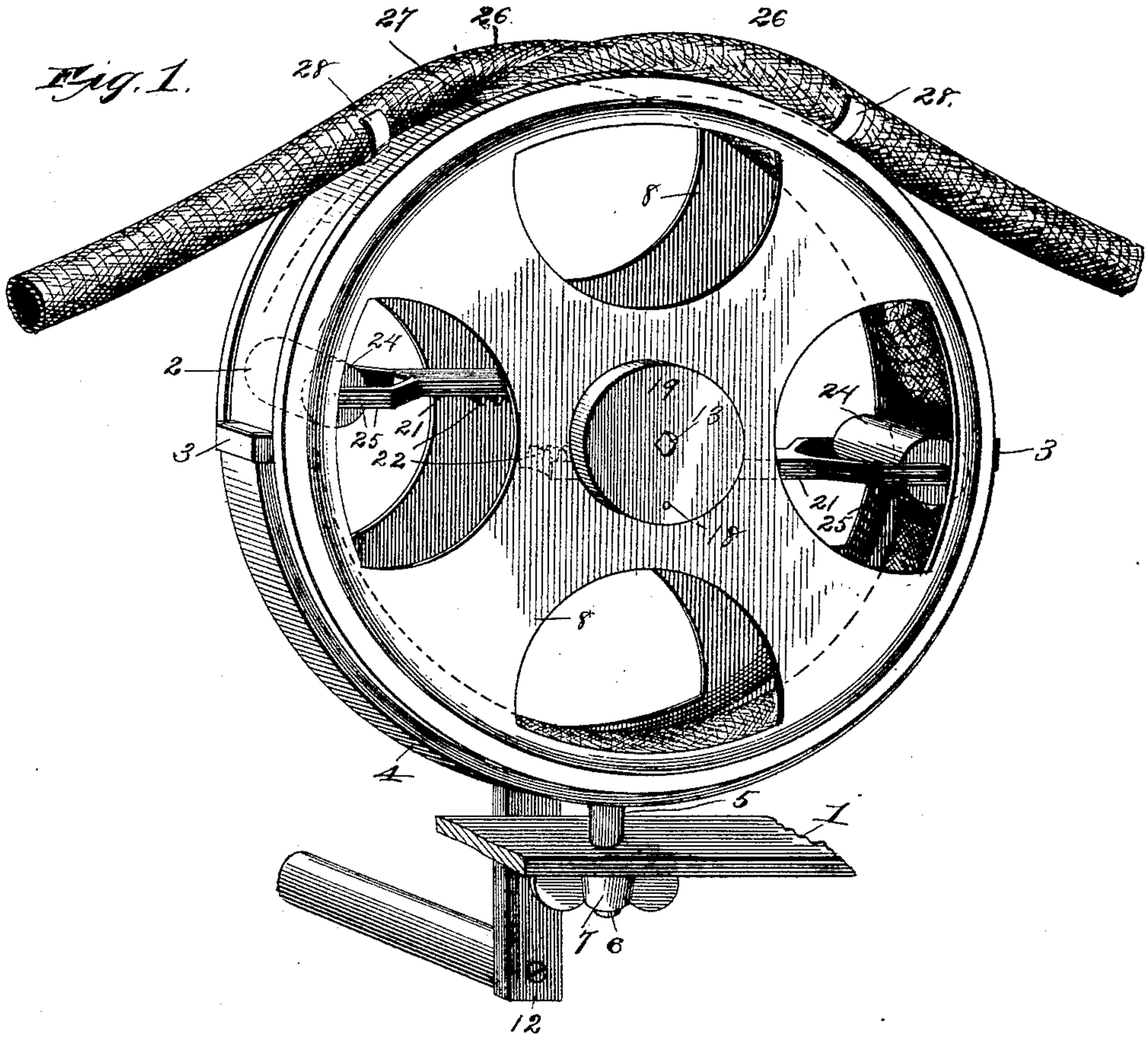


Fig. 5.

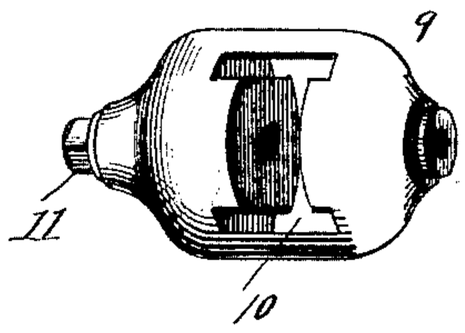
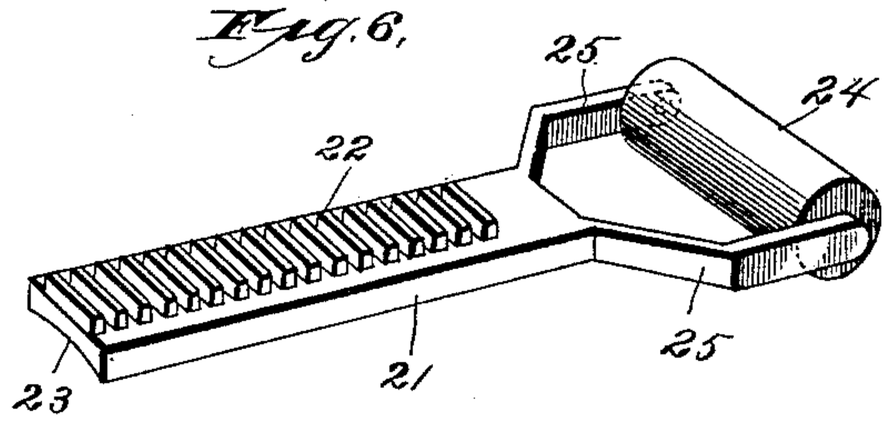


Fig. 6.



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(No Model.) 2 Sheets—Sheet 2.

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Fig. 4.

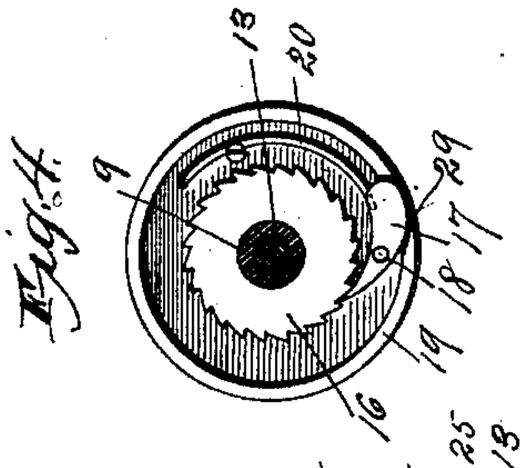

Fig. 7.

Fig. 3.

Fig. 2.

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UNITED STATES PATENT OFFICE.

DAVID C. BURSON, OF TOPEKA, KANSAS.

VACUUM AND FORCE PUMP.

SPECIFICATION forming part of Letters Patent No. 460,944, dated October 13, 1891.

Application filed June 15, 1891. Serial No. 396,346. (No model.)

To all whom it may concern:

Be it known that I, DAVID C. BURSON, of Topeka, Shawnee county, Kansas, have invented certain new and useful Improvements in Vacuum and Force Pumps, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention relates to combined force and suction pumps which are especially designed for use in spraying fruit-trees, plants, and other vegetation, also for extinguishing fires, washing vehicles, and for scientific, surgical, and various other purposes.

The object of my invention is to produce a pump which shall be simple, durable, and comparatively inexpensive in construction and which shall also possess powerful suction and forcing action; furthermore, to produce a pump in which the amount of power developed by the pump can be readily and quickly varied to a greater or less degree, as desired.

To the above purposes my invention consists in certain peculiar and novel features of construction and arrangement, as hereinafter described, and pointed out in the appended claims.

In order that my invention may be fully understood, I will proceed to describe it with reference to the accompanying drawings, in which—

Figure 1 is a perspective view of my improved suction and force pump. Fig. 2 is a transverse vertical section of the same on the line 2 2 of Fig. 3. Fig. 3 is a transverse vertical section of the same on the line 3 3 of Fig. 2. Fig. 4 is a detached view of the pawl-and-ratchet mechanism for varying the power of the pump, the view showing the inner side of said mechanism. Fig. 5 is a detached perspective view of the hub of the pump. Fig. 6 is a detached perspective view of one of the rack-arms which carry the presser-rollers, one of said rollers being shown in position upon the arm. Fig. 7 is a detached perspective view of the shaft of the adjusting gear-pinion.

In the said drawings, 1 designates a support upon which the pump is placed, the said support being of any suitable or preferred character—such as a standard, bench, or any other structure sufficiently strong and rigid to properly sustain the pump.

2 designates the rim of the pump-casing, said rim being of circular form and having at each side, at points horizontally opposite from its center, a loop 3.

4 designates a U-shaped or semicircular standard, which embraces the lower part of the rim 2 and the upper ends of which are embraced by the straps 3 just mentioned. At its middle this standard is formed with a downwardly-extending boss 5, from the outer end of which extends a screw-rod 6, which is designed to extend through the support 1 and upon which is screwed a set-nut 7, which confines the support 1 between itself and the lower part of the boss 5, thus securely retaining the pump in position upon the support.

8 designates the two side pieces or plates of the pump-casing, said plates being preferably of open or skeleton form, as shown, and being suitably secured at their edges to the edges of the rim 2. Journaled centrally within this casing is a hub 9, which is formed with a transverse opening 10 and the ends of which rest in openings in the centers of the side plates 8. One end 11 of this hub is made square or angular and projects out through one of the side pieces 8 and receives a crank-arm 12 or a belt-pulley or any other preferred attachment for receiving power for rotating the hub and thus actuating the pump.

13 designates a short shaft which passes horizontally into one side of the hub and which terminates a short distance within the body of the hub, as shown in Fig. 3. This shaft is provided about midway of its length with a squared portion 14, upon which is placed a gear-pinion 15, said pinion being first inserted through the opening 10 of the hub and the shaft being then pushed into position through the center of the pinion. Upon the opposite end of the hub 9 from that which carries the crank-arm 12 is rigidly mounted a ratchet-wheel 16, the teeth of which are engaged by a pawl 17, which is pivoted at 18 upon the inner surface of a disk 19, said disk being keyed or otherwise similarly secured upon the outer end of the shaft 13. A semicircular spring 20, which is secured to the inner surface of the disk 19, engages by its free end the outer part of the

pawl 17, and thus retains the tip of the pawl in engagement with the teeth of the ratchet-wheel 16. The operation of this ratchet mechanism will be presently described.

21 designates two rack bars or arms, each of which is provided on one side with a number of rack-teeth 22, engaging the teeth of the gear-pinion 15 at opposite sides of said pinion. The opposite sides of these rack bars or arms from those which are provided with the rack-teeth 22 are dished transversely, as shown at 23, so as to cause these sides of the bars or arms to engage only at their edges upon the surfaces of the opening 10 of the hub. By virtue of this construction the friction between these parts is reduced to the minimum and all possibility of binding or sticking of the bars or arms in the hub by reason of rust or other causes is avoided. At the outer end of each of these arms or bars 21 is carried a cylindrical roller 24, the ends of which are journaled in the outer ends of two arms 25, which project from the outer ends of the arms or bars 21. These rollers are so arranged as to press upon the inner surfaces of the coils of a suitable collapsible tube 26, said coils lying against the inner surface of the rim 2, as shown, and the outer portions of said tube extending oppositely through openings 27 in upper side of the rim 1. These outwardly extending portions of the tube 26 are retained in proper position, so as to prevent dislocation of the coils within the casing, by two U-shaped spring-clips 28, secured upon the outer surface of the rim 2, at the upper part thereof.

The general operation of the above-described machine is as follows: It is to be understood that one end of the tube 26 is to be inserted into a suitable reservoir of liquid or is to be attached to any part of the body to be operated upon surgically, as by cupping or the like, and the opposite end of the tube is to be provided, if desired, with any suitable form of discharge-nozzle. Now by turning the crank-handle 12 in one direction the rollers 25 are caused to travel over the inner surfaces of the coils of the tube, successively compressing the tube and forcing the air, water, or other fluid out of one end of the tube and simultaneously drawing such fluid in at the opposite end of said tube. The force with which this drawing and forcing action takes place is readily varied, so as to be greater or less by successively turning the disk 19 in one direction, engaging the pawl 17 with the teeth of the ratchet-wheel 16, and thus forcing the arms or bars 21 outward by the consequent revolution of the gear-wheel 15, and thus causing the rollers 25 to press more firmly upon the coils of tube 26. In order to produce a less powerful action of the pump the finger is pressed upon the outer part of the pawl 17, an opening 29 being formed in the rim of the disk 19 for this purpose, and the elasticity of the tube will retract the arms 21, and thus decrease the pressure of the rollers 25 upon the tube.

Having thus described my invention, what I claim as new therein, and desire to secure by Letters Patent, is—

1. An improved force and suction pump comprising a circular casing, a collapsible tube coiled therein, a revoluble hub journaled therein and provided with an internal gear-pinion, and a pair of rack-arms extending oppositely through the hubs and engaging by their rack-teeth the teeth of the pinion and each carrying at its outer end a roller arranged to press upon the surfaces of the coils of tube, substantially as set forth.

2. An improved suction and force pump comprising a circular casing, a revoluble hub journaled therein, a collapsible tube coiled within the casing, a shaft inserted into the hub and carrying a gear-pinion, a pair of rack-arms extending oppositely through the hub and engaging by their rack-teeth the teeth of the pinion, a pair of rollers at the outer ends of said arms engaging the coils of the tube, a ratchet-disk rigidly mounted upon one end of the hub, and a disk rigidly mounted upon the outer end of the pinion-shaft and carrying a spring-pawl to engage the teeth of the ratchet-disk, substantially as set forth.

3. An improved vacuum and force pump comprising a circular casing, a revoluble hub journaled therein, a collapsible tube coiled within the casing, a shaft inserted into the hub and carrying a gear-pinion working within the hub, and a pair of rack-arms extending oppositely through the hub, and engaging by their rack-teeth the teeth of the pinion, and each carrying at its outer end a roller arranged to press upon the surface of the coils of the tube, the said rack-arms being each dished upon its outer side at the point of contact with the interior of the hub, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

DAVID C. BURSON.

Witnesses:
JNO. L. CONDRON,
H. E. PRICE.