(No Model.)

J. F. BARKER.

ROTARY AIR PUMP.

No. 341,871. Patented May 18, 1886.

Fig. 1

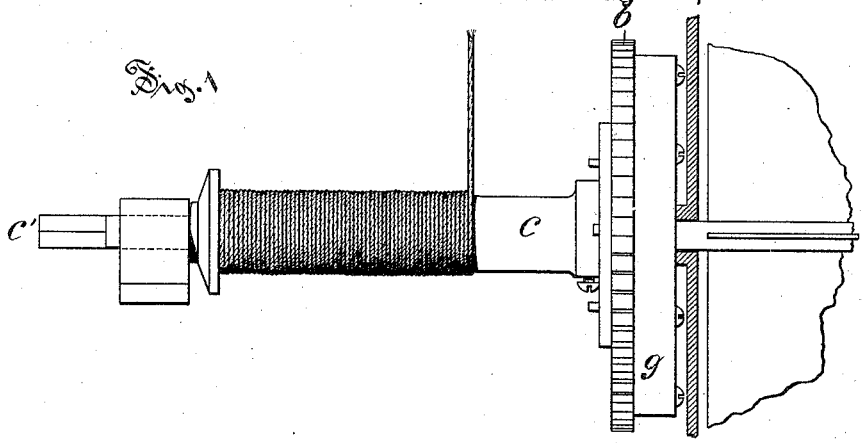


Fig. 4

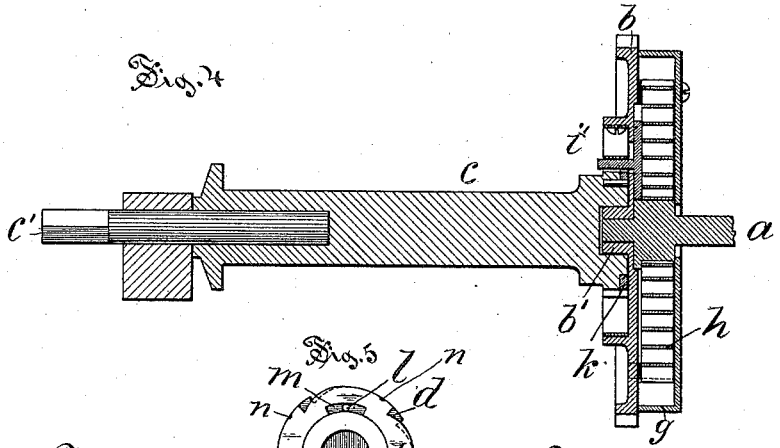


Fig. 5

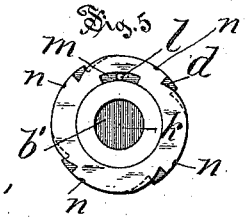


Fig. 2

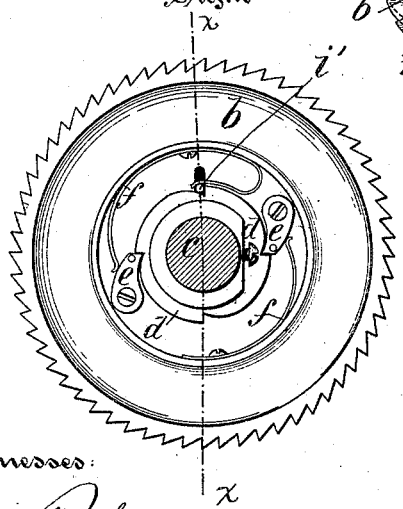
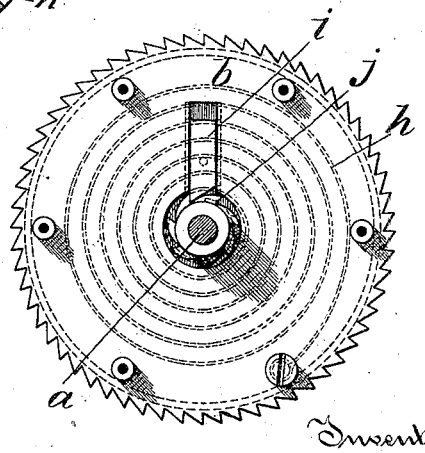


Fig. 3



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UNITED STATES PATENT OFFICE.

JOHN F. BARKER, OF SPRINGFIELD, MASSACHUSETTS.

ROTARY AIR-PUMP.

SPECIFICATION forming part of Letters Patent No. 341,871, dated May 18, 1886.

Application filed August 19, 1885. Serial No. 174,777. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. BARKER, of Springfield, in the county of Hampden and State of Massachusetts, have invented a certain new and useful Improvement applicable to Rotary Air-Pumps and the like, of which the following is a description, reference being had to the accompanying drawings, where—

Figure 1 is a top view. Fig. 2 is a side view of the outer face with winding-drum broken off, parts in same position as when the weight is regularly operating the air-pump. Fig. 3 is a side view of inner face with spring-case removed; Fig. 4, a view in central vertical section on plane *x x;* Fig. 5, a view of inner face of ratchet-collar in place upon the ratchet appurtenant to the winding-drum.

This improvement will be described herein as applied to such a rotary air-pump as is commonly used for forcing air into and through a tank containing gasoline for the production of an "illuminating-gas," so called. These rotary air-pumps are well-known affairs. They are cylindrical in shape, and have a set of rotary fans inside, the same in general construction as the rotary fans of a wet gas-meter. Outside the cylindrical case there is a drum taking upon it a cord, whereby to wind up the weight which propels the rotary fans. This drum is rotarily loose on the shaft of the rotary fans, so that the weight may be wound up without rotating the fans; but when the drum would turn in the opposite direction a ratchet and pawls attach it rotarily to the shaft of the rotary fans, so that the fans are driven by the descent of the weight. In practice it has been found desirable to attach the winding-drum to the shaft of the rotary fans through the intervention of a coiled spring, to the end that this coiled spring shall cause the rotary fans to rotate while the weight is being wound up. It has been found desirable to use a coiled spring of a very considerable length for this purpose, in order that it may exert a rotary force of considerable duration in point of time upon the rotary fans, for the purpose of giving a very considerable interval wherein to wind up the weight, the fans continuing to rotate properly meanwhile. It has been found in practice that in using a spring of considerable length for this purpose the action of the weight in descending upon the rotary fans has been irregular, partly and mainly for the reason that the pulleys and cords will not practically run with the same ease at all points in the descent of the weight. The improvement now about to be described permits the use of a coiled spring for the said purpose, of any desired length, and cures the difficulty heretofore incident to the use of such long springs for this purpose, and has also other advantages, which will be developed in the description.

In the drawings, the letter *a* denotes the shaft of a rotary air-pump, such as has already been referred to. Such shafts are properly journaled in the heads or ends of the outer cylindrical case. Outside such cylindrical case the end of this shaft has rotarily loose thereon the disk *b*.

The letter *c* denotes the winding-drum, which takes upon it the cord or wire at the other end of which the propelling-weight is attached. The inner end of this winding-drum is journaled upon a boss, *b'*, projecting from the disk *b*. The outer end of this winding-drum is journaled in a proper support, and the extreme outer end, *c'*, is squared to take upon it a winding-handle, whereby to wind the weight-cord upon the winding-drum. At its inner end this winding-drum carries a ratchet, *d*, co-operating with the pawls *e e*, pressed to their work by the springs *f f*, so that in the descent of the weight the disk *b* moves and rotates with the drum *c;* but when the weight is being wound up this described arrangement of ratchet and pawls permits the disk *b* to remain stationary. On the back of the disk *b* there is attached, by suitable screws or the like, a spring-case, *g*, within which is the long coiled spring *h*, by which the disk *b* is connected to the air-pump shaft *a*. When the weight is wound up for the first time, and its gravity allowed to operate, its first effect is to coil up the spring *h* until the pulling-power of the weight counterbalances and overcomes the resistance offered by the compressed air to the revolution of the air-pump shaft, and when that point is reached, as the air in the shape of an illuminating-gas escapes through the burners, the weight will cause the air-pump shaft, with its forcing-fans, to revolve. This

mechanism includes a device which locks the disk *b* to the shaft *a* after the spring has been coiled by the action of the weight, as already described, so that there shall be no such fluctuation between the relative motions of the two as has heretofore been incident to the difficulty already mentioned heretofore existing in devices of this general class. To this end there is provided the sliding pawl *i*, sunk in a mortise in the inner face of disk *b*, and co-operating with the ratchet *j* appurtenant to the shaft *a*. It will be observed that the co-operation of this pawl and ratchet just described is such as to permit the coiled spring to be coiled by the first action of the weight, as already described, after which the pawl holds the two rotarily together, and prevents the difficulty of fluctuation in pressure already referred to.

I will now describe how the pawl *i* is released from the ratchet *j* in the operation of winding, so that the coiled spring may then exert its winding force upon the shaft *a* while the winding of the weight is going on. On the outer side of the sliding pawl *i* there is a pin, *i'*, projecting through a proper mortise in the disk *b* and co-operating with the ratchet *d*. This ratchet-wheel has its edge which lies between the teeth formed in the arc of a circle having for its radius a line equal to the distance from the center of the drum *c* to the point of a tooth, so that when the ratchet *d* is rotated, as it must be in the winding up of the weight, it, through the medium of the pin *i'*, forces the sliding pawl *i* out of contact with the ratchet *j*, and practically keeps it out of contact therewith while the whole operation of winding is going on, leaving the coiled spring *h* meanwhile to exert its winding force upon the shaft *a*, and thereby keep up the air-pressure. It might be supposed that when this winding operation is begun the air pressure would immediately begin to decrease; but in practice such is not the fact, for when the spring is first coiled by the action of the weight it naturally is coiled to a degree somewhat greater than is sufficient to overcome the resistance of the air-pressure, so that, as a matter of fact, when the winding of the weight begins the first tendency is to give an increased air-pressure.

Those familiar with apparatus of this general kind will understand that it is sometimes necessary to run down the weight for repairs and other purposes rapidly, to attain which there must be some disconnection between the winding-drum and the shaft *a*, and in this present mechanism such end is attained by means as follows: At and next the ratchet *d* there is a separate ratchet-collar, *k*, upon the winding-drum, which rotates with the ratchet *d* in winding up the weight, by means of the pin *l* appurtenant to the ratchet *d* extending into the mortise *m* in the ratchet-collar. The intermeshing of this pin and mortise permits the ratchet-collar to remain stationary, rotarily for a little time, when the ratchet *d* is rotated in a direction opposite that necessary to wind up the weight, (a thing made permissible by raising the pawls *e e*.) This device I am now describing is made use of for the purpose just mentioned as follows: Supposing the pawls *e*, as is the natural condition of things, to be in close contact with teeth on the ratchet *d* and ratchet-collar *m*, the winding-drum, and with it the ratchet *d* and ratchet-collar *m*, is rotated forward (that is, in the direction to wind up the weight) until the ends of these pawls *e e* drop into the slight notches *n* to be found in the periphery of the ratchet-collar. In this condition of things the pawls *e e* are resting on the periphery of the ratchet-collar, and the sliding pawl *i* is forced out of contact with the ratchet *j*. Now the "lost motion" between the ratchet *d* and the ratchet-collar (attained by co-operation of the pin *l* and mortise *m*) allows the ratchet *d* to be turned backward about half the distance between two of the teeth on ratchet *d* before the ratchet-collar will move with the ratchet *d* in this backward direction, and now, when they both move together in this backward direction, all three of the said pawls are kept raised, because the periphery of the ratchet bridges the tooth-indentations in the ratchet-collar, and the periphery of the ratchet-collar bridges the tooth-indentations in the ratchet as long as this backward motion of both is continued; but very soon after the ratchet *d* is rotated in the opposite or forward direction the tooth-indentations in the ratchet *d* and ratchet-collar become coincident, the lost motion between the two is again taken up, and in the prolongation of such forward motion the two act together as one ratchet.

It will be observed that in case the weight runs down and the air-pump stops, the moment a person begins to wind up the weight the coiled spring is released and exerts its force to operate the air-pump shaft.

I claim as my improvement—

1. The shaft *a*, a coiled spring and ratchet, *j*, connected therewith, the disk *b*, journaled rotarily on said shaft, carrying a sliding pawl, *i*, having a pin, *i'*, the said pawl adapted to engage said ratchet upon the shaft *a*, and the spring-operated pawls *e*, combined with a winding-drum provided with a ratchet, *d*, fixed thereon, having its edge between the teeth lying in the arc of a circle, as set forth, the said ratchet being engaged by the pawls *e* when the drum is turned in one direction, and adapted by its described construction to operate the pin on the pawl to disengage it from the ratchet upon the shaft when the drum is turned in the opposite direction, to permit the spring to operate the shaft, in the manner set forth.

2. The shaft *a*, a coiled spring and ratchet, *j*, connected therewith, the disk *b*, journaled rotarily on said shaft, and carrying a sliding pawl, *i*, having a pin, *i'*, the said pawl adapted to engage the ratchet upon the shaft *a*, and

the spring-operated pawls *e*, a winding-drum adapted to be rotated independently of the shaft *a*, provided with a fixed ratchet, *d*, constructed substantially as described, and engaged by the pawls *e*, combined with the loose disk *k*, located upon said drum next the ratchet *d*, and constructed similar to said ratchet, so that when properly turned it will bridge the notches forming the teeth in the said ratchet, substantially as and for the purpose set forth.

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