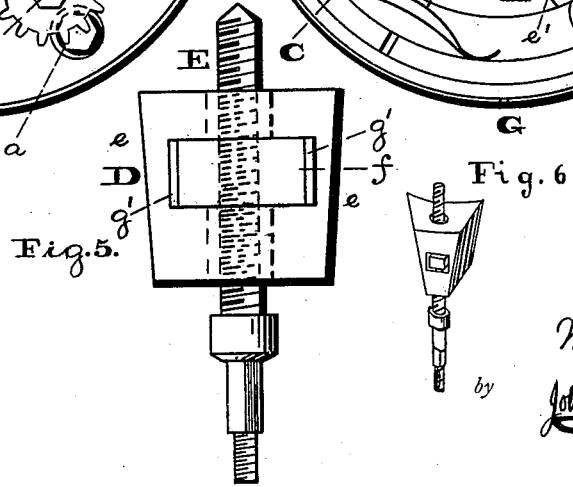
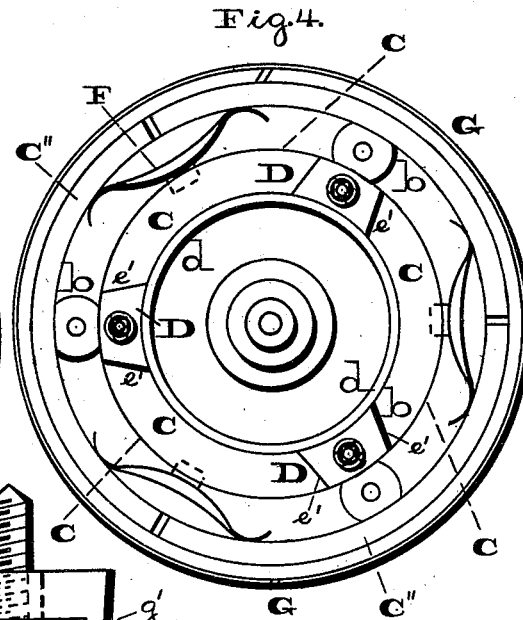
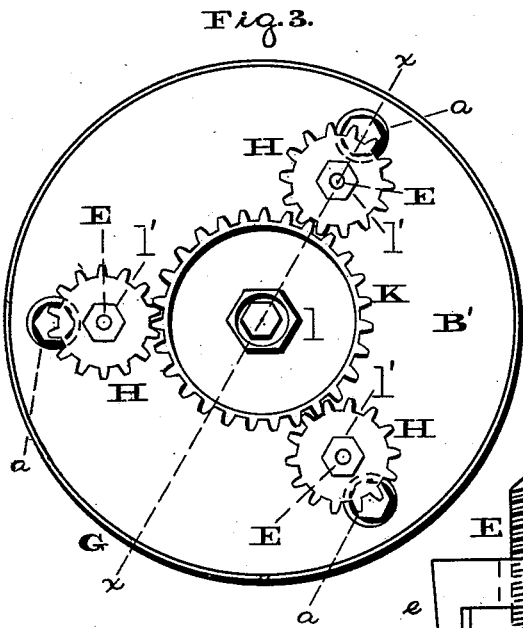
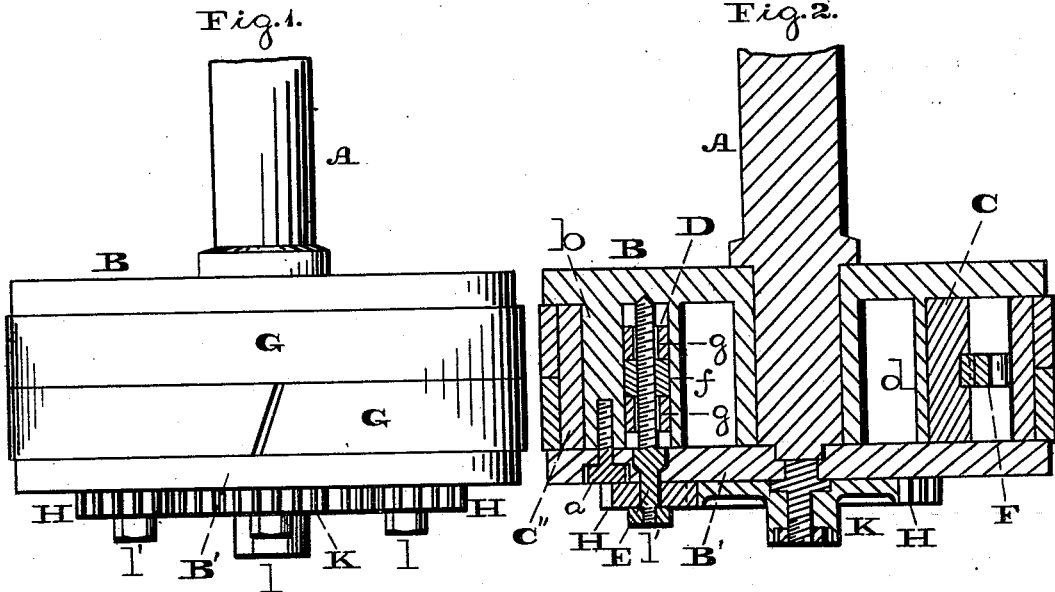


W. SPRAGUE.
Piston.

No. 200,098.

Patented Feb. 5, 1878.



Witnesses:
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UNITED STATES PATENT OFFICE.

WILLIAM SPRAGUE, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN PISTONS.

Specification forming part of Letters Patent No. 200,098, dated February 5, 1878; application filed December 20, 1877.

To all whom it may concern:

Be it known that I, WILLIAM SPRAGUE, of the city and county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Pistons, which improvement is fully set forth in the following specification and accompanying drawings, in which—

Figure 1 is a side elevation of the piston embodying my invention. Fig. 2 is a central section thereof in line *x x*, Fig. 3. Fig. 3 is a bottom view thereof. Fig. 4 is a view of the inside thereof. Fig. 5 is a view of a detached part.

Similar letters of reference indicate corresponding parts in the several figures.

My invention relates to expansible pistons, in which the requisite expansion is attained through the medium of adjustable wedges, adapted to operate in connection with one or more sectional or segmental rings and suitable springs applied thereto.

My improvement consists, first, in the conformation and adaptation of the wedges with reference to the segmental ring; secondly, in the construction of the wedge and means for adjusting the same; and, thirdly, in so disposing the heads of the screws or studs of the wedges and the gearing thereof that the said screws or studs may be simultaneously rotated by operating either wheel of the gearing.

Referring to the drawings, A represents the piston-rod; B, the spider, and B' the follower, said spider and rod being firmly connected, and the follower secured to the spider by bolts *a*, passed through the follower into posts *b* of the spider.

C represents a sectional or segmental ring, which surrounds the hub or shell *d* of the spider; and between the ends of adjacent sections there are fitted wedges D, which, with the sections of the ring, constitute a full circle, the wedges consisting of wedge-shaped blocks *e*, having beveled sides *e' e'*, which engage with the contiguous wedging sides of the sections, and nuts *f*, which are located in openings *g'* in the blocks, as shown more clearly in the perspective view, Fig. 6. Screws or studs E, stepped on the head of the spider, are passed loosely through the wedges and snugly through the nuts *f*, the openings *g*, through which the screws or studs pass, being greater than the

thickness of said screws or studs; and the nuts are smaller than the openings or spaces *g'*, which they occupy in the wedges. By these means ample provision is made for expansion and contraction of the wedges and nuts without causing binding of the screws or studs or otherwise affecting the same.

F represents springs, which are interposed between the ring C and the expansible ring C'', which latter is encircled by the exterior slit rings G. To the center of each spring there is secured a lug, which enters a corresponding-shaped opening in the center of each section of ring C, whereby the springs will be properly located and prevented from shifting.

The wedges have a certain amount of play in the space which they occupy in the direction between the spider and follower, as seen more clearly in Fig. 2; and the operating screws or studs E of said wedges are swiveled to the follower, and they project through the follower B', outside thereof, where they have fitted on their squared portions pinions H, which, by means of an interposed pinion, K, gear with each other, as seen in Fig. 3, said pinion being mounted on a stud fitted to the follower, and retained thereon by a ring, V.

The head *l* of the pinion K and the tightening-nuts V, which confine the pinions H on the screws or studs E, are so disposed on the outside of the follower C' that they are readily accessible, and thus either pinion may be operated in order to simultaneously operate the several pinions and consequently the wedges.

When the piston is to be expanded, a key or wrench will be fitted to either the head or nut of the pinions H K and properly turned, whereby the screw or studs E will be rotated. This moves up the wedges D, and, owing to their shape, the sections of the rings C will be forced out from the hub or wheel *d*. This increases the pressure of the springs F, the action whereof is exerted on the ring C'', and consequently on the external rings G, and thus the piston is expanded.

When the gearing H K is operated in a reverse direction; the internal ring C is relieved of the expansive action of the wedges, and the springs F are likewise relieved, and thus the exterior rings of the piston are permitted to contract.

It will be noticed that, in operating the wedges, should one spring possess greater power than the other springs, the strain is transferred from one section to the adjacent wedge and to the remaining sections and wedges, thus equalizing the pressure on the external rings without placing the piston out of the center of the cylinder.

It will also be noticed that the gearing H K may be operated without removal of the cylinder-head, it being only necessary to form on the head openings sufficient to admit of a key or socket-wrench, said openings being afterward properly closed by screw-plugs or otherwise.

By tightening the nut *l'* of the pinion K the latter will be locked, thereby locking the other pinions, and consequently the wedges, the several parts of the piston thus retaining their set positions without liability of working loose.

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

1. In a piston provided with a sectional or segmental ring, with suitable springs applied around the same, the wedges D, having a

wedge shape in vertical section, and beveled so as to have in horizontal section a like conformation, the same being adjusted between thesegments of the ring so as to constitute therewith a full circle, and adapted to expand the same, in the manner substantially as herein shown and described.

2. As a means for adjusting the wedges D, a screw or stud passing vertically through each wedge, and a nut arranged upon the screw within an enlarged central opening, *g'*, whereby the said wedge with its partially-inclosed nut may be adjusted by the rotation of the screw, substantially as shown and specified.

3. The screws or studs projecting through the follower, in combination with gear-wheels H, having engaging-nuts *l'*, and the gear-wheel K, having a head, *l*, and nut *l'*, whereby the wedges may be simultaneously operated by rotation of either of the gear-wheels H K, substantially as and for the purpose set forth.

WILLIAM SPRAGUE.

Witnesses:

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