

Aug. 6, 1940.

D. M. SMITH

2,210,844

PISTON EXPANDER

Filed Jan. 6, 1940

2 Sheets-Sheet 1

FIG.1.

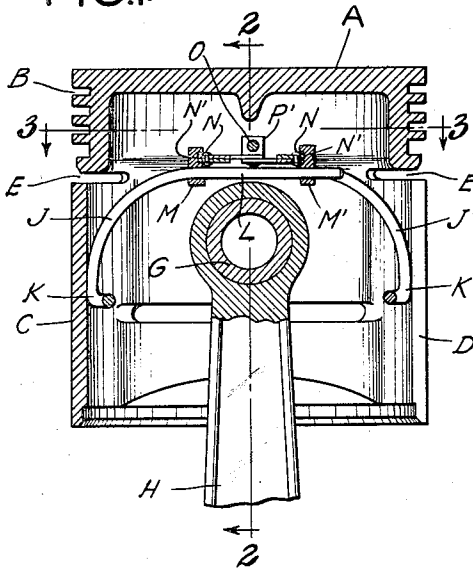


FIG.2.

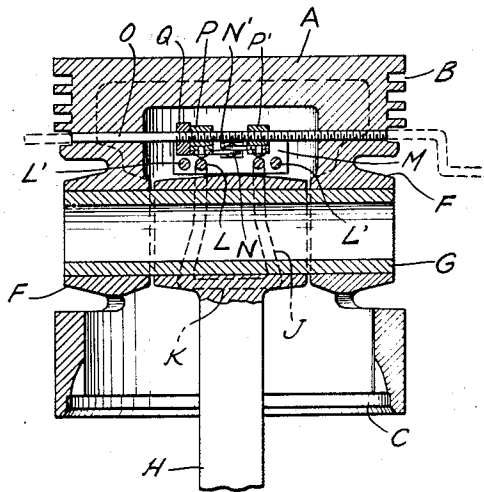


FIG.3.

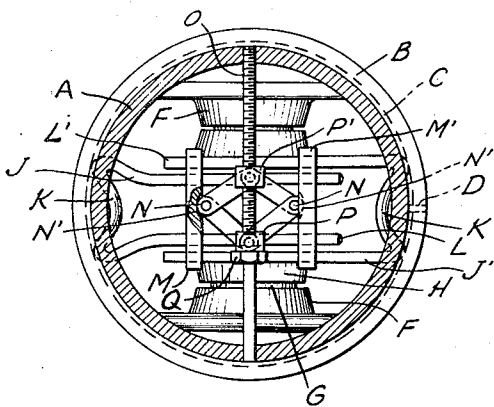


FIG.4.

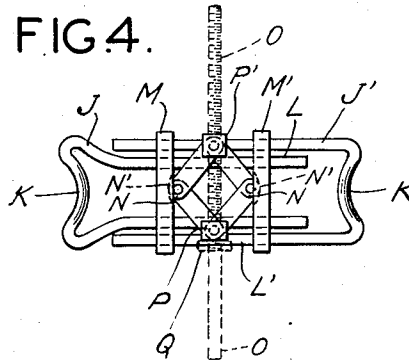


FIG.5.

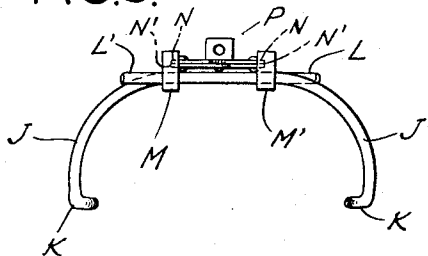
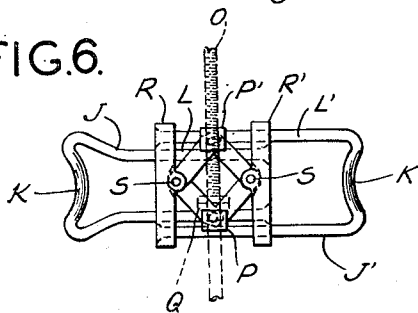


FIG.6.



INVENTOR:
DALLAS M. SMITH,
By *Henry K. Kiesel*
ATTORNEY.

Aug. 6, 1940.

D. M. SMITH

2,210,844

PISTON EXPANDER

Filed Jan. 6, 1940

2 Sheets-Sheet 2

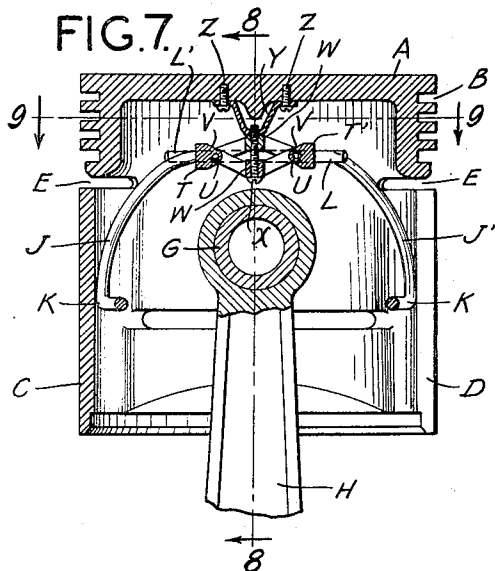
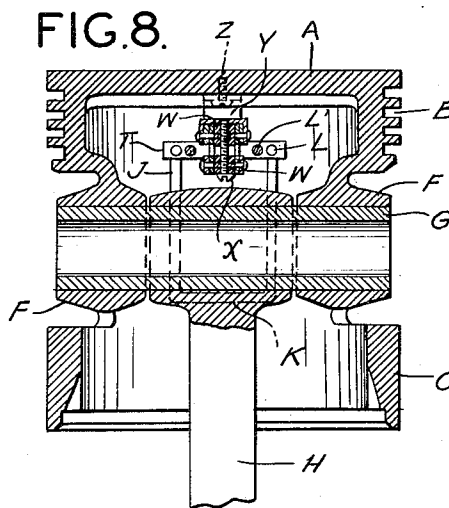


FIG. 9.

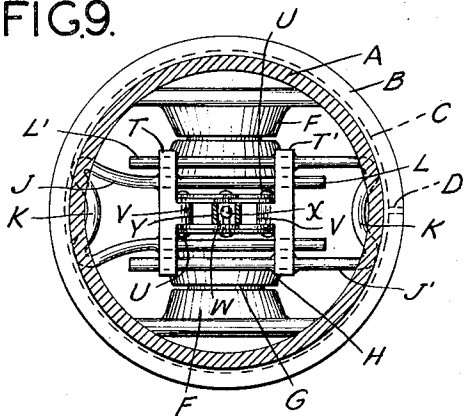


FIG. 10.

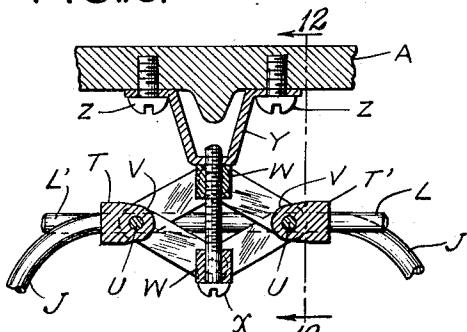


FIG. 11.

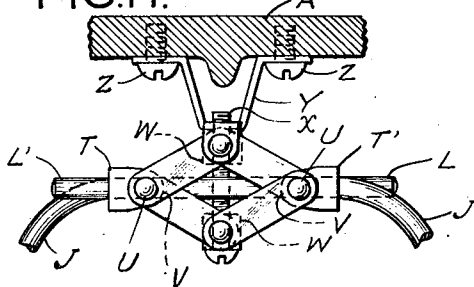
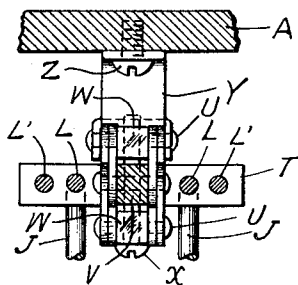


FIG. 12.



INVENTOR:
DALLAS M. SMITH,
By *Henry Knealy*
ATTORNEY.

UNITED STATES PATENT OFFICE

2,210,844

PISTON EXPANDER

Dallas M. Smith, Kirkwood, Mo., assignor to
McQuay-Norris Manufacturing Company, St.
Louis, Mo., a corporation of Delaware

Application January 6, 1940, Serial No. 312,749

3 Claims. (Cl. 309—12)

My invention relates to piston expanders and more particularly to piston expanders of the type described in my co-pending application, which expanders comprise a pair of skirt engaging parts movable away from or toward one another, whereby the expansive force exerted by said parts to increase the effective diameter of the piston skirt may be varied and adjusted.

The specific type of expander to which the present invention applies is a device comprising a pair of legs movable relative to one another and means for so moving the legs and maintaining them in predetermined adjusted position.

The objects of this invention are to provide in an expander of the adjustable type, as mentioned above, a simple and positive means for moving the legs whereby the expander may be adjusted quickly and easily. In the accompanying drawings wherein similar characters are used to designate similar parts, I have shown several embodiments of my new and improved device in its simpler forms. In these drawings, Fig. 1 is a section through a piston including the expander; Fig. 2 is a section along the lines 2—2 in Fig. 1; Fig. 3 is a cross section along the lines 3—3 in Fig. 1; Figs. 4 and 5 are detailed views of the expander shown in the first three figures; Fig. 6 shows a slightly modified form of device; Fig. 7 is a section through a piston including another embodiment of my invention; Fig. 8 is a section along the lines 8—8 in Fig. 7; Fig. 9 is a transverse section along the lines 9—9 in Fig. 7; Figs. 10 and 11 show detailed means for adjusting the movable parts of the expander; Fig. 12 is a section along the lines 12—12 in Fig. 10.

Referring to the figures the embodiments of my invention shown therein are included in a piston comprising a head A containing the usual ring belt B and having depending therefrom a skirt C slotted axially as at D to provide resiliency and separated throughout most of its periphery from the head by circumferentially extending slots E. The piston also includes the usual pin bosses F to receive a wrist pin G upon which is mounted the upper end of a connecting rod H.

The expander shown in Figs. 1 to 5, inclusive, comprises a pair of legs J and J', each formed, in this embodiment, of spring wire and each having a skirt engaging portion K arranged at the lower end thereof and having the upper end arranged to form straight portions L and L', respectively, coincident with one another. The portions K are adapted to engage the skirt at points removed substantially 90 degrees from the piston bosses. Fixed to the straight portions L

of the leg J is a bar M which is slidably mounted on the straight portions L' of the leg J' and, similarly, fixed to the straight portions L' of the leg J' is a bar M' which is slidably mounted on the straight portions L of the other leg.

It will be obvious that when the bars M and M' are moved away from one another the legs will be moved away from one another also and the distance between the skirt engaging portions K will be increased to exert a greater expansive force upon the skirt of a piston in which the expander is used directed substantially at right angles to the boss axis. Likewise, if the bars M and M' are moved toward one another the distance between the portions K will be decreased and less expansive force will be exerted by the portions K against the skirt.

The present invention, as stated above, is directed toward means for moving the legs and maintaining them in predetermined adjusted position and such means comprises a double toggle joint arranged between the bars M and M'. In the embodiment now being discussed the knuckles N of the double toggle joint fit in grooves N' formed in the bars M and M' and movement of the toggles to vary the distance between the bars M and M' is effected by rotation of an adjusting rod O freely rotatable in the block P and threaded in the block P'. A nut Q is fixed to the rod O to bear against the outer side of the block P. Obviously rotation of the rod in one direction will move the threaded block P' along the rod toward the nut Q and, in turn, toward the block P. When this movement is effected the knuckles N of the double toggle joint will be moved away from one another and, in turn, this movement will be transmitted to the bars M and M' to separate the legs J and J'.

The rod O may be mounted in any way, but in this form of invention this rod extends through suitable holes drilled at substantially diametrically opposed points in the lower ring groove of the ring belt B and, therefore, the rod O in addition to operating the adjusting means for the expander also will mount the expander on the head of the piston. Preferably, the rod O when first inserted in place has one end thereof bent to form a crank, as indicated in Fig. 2 to facilitate rotation thereof when the expander is adjusted. The ends of the rod are cut off flush with the bottom of the ring groove after the expander has been adjusted in the piston.

In Fig. 6 the bars R and R' are fixed to the ends of the straight portions L and L' of the legs J and J' and the parts are arranged whereby

the legs and their carried skirt engaging portions K are separated when the bars R and R' are brought closer together. Therefore, the toggle pins S in the knuckles of the toggle joint extend through brackets formed integral with the bars R and R' and a nut Q is arranged on the inner side of the block P whereby rotation of the rod O will move the parts away from one another to bring the bars R and R' closer together to effect a separation of the skirt engaging portions of the expander.

In the embodiment of my invention shown in Figs. 7 to 12, inclusive, the double toggle joint for adjusting the legs J and J' and for moving the bars T and T' away from one another to effect separation of the skirt engaging portions K of the legs is arranged for movement in a plane parallel to the axis of the piston. The toggle pins U are mounted in brackets V integral with the bars T and T' and the blocks W of the toggle are brought closer together by rotation of a bolt X which is threaded in a bracket Y fixed to the head of the piston by studs Z or by any other suitable expedient. When the bolt X is turned down the blocks W will be brought closer together to separate the bars T and T' and, in turn, to move the legs J and J' and their skirt engaging portions K away from one another whereby an increased expansive force will be exerted against the skirt portion. With the use of this embodiment the expander may be adjusted by a screw driver before the wrist pin G and connecting rod H are mounted on the piston.

It should be understood that while I have shown only a few simple embodiments of my new and improved invention in the accompanying drawings, various other forms of expander in which the size, shape and arrangement of the parts have been changed from those shown herein may be made without departing from the spirit of my invention as included in the appended claims. For instance, in some forms of device

a single toggle may suffice to adjust the expander.

What I claim as new and desire to secure by Letters Patent, is:

1. A piston expander comprising a pair of parts movable away from or toward one another and having skirt engaging portions, arranged to exert an expansive force on said skirt directed substantially at right angles to the boss axis, a toggle arranged to control relative movement of said parts, and means for operating said toggle whereby said parts may be adjusted to vary the expansive force exerted by said engaging portions against said skirt.

2. A piston expander comprising a pair of legs movable away from or toward one another and each having a skirt engaging portion adapted to engage the piston skirt at points removed substantially 90 degrees from the piston bosses and arranged to exert an expansive force on said skirt directed substantially at right angles to the boss axis, and a toggle arranged to control relative movement of said legs and means for operating said toggle whereby said legs may be adjusted to vary the expansive force exerted by said engaging portions against said skirt.

3. A piston expander comprising a pair of legs movable away from or toward one another, and each having a skirt engaging portion, said legs each terminating at its upper end in a straight portion, a bar fixed to the straight portion of each of said legs and slidable relative to the straight portion of the other of said legs whereby movement of said bars away from or toward one another will move said legs, and a toggle arranged to control relative movement of said bars and means for operating said toggle whereby said legs may be adjusted to vary the expansive force exerted by said engaging portions against said skirt.

DALLAS M. SMITH.