

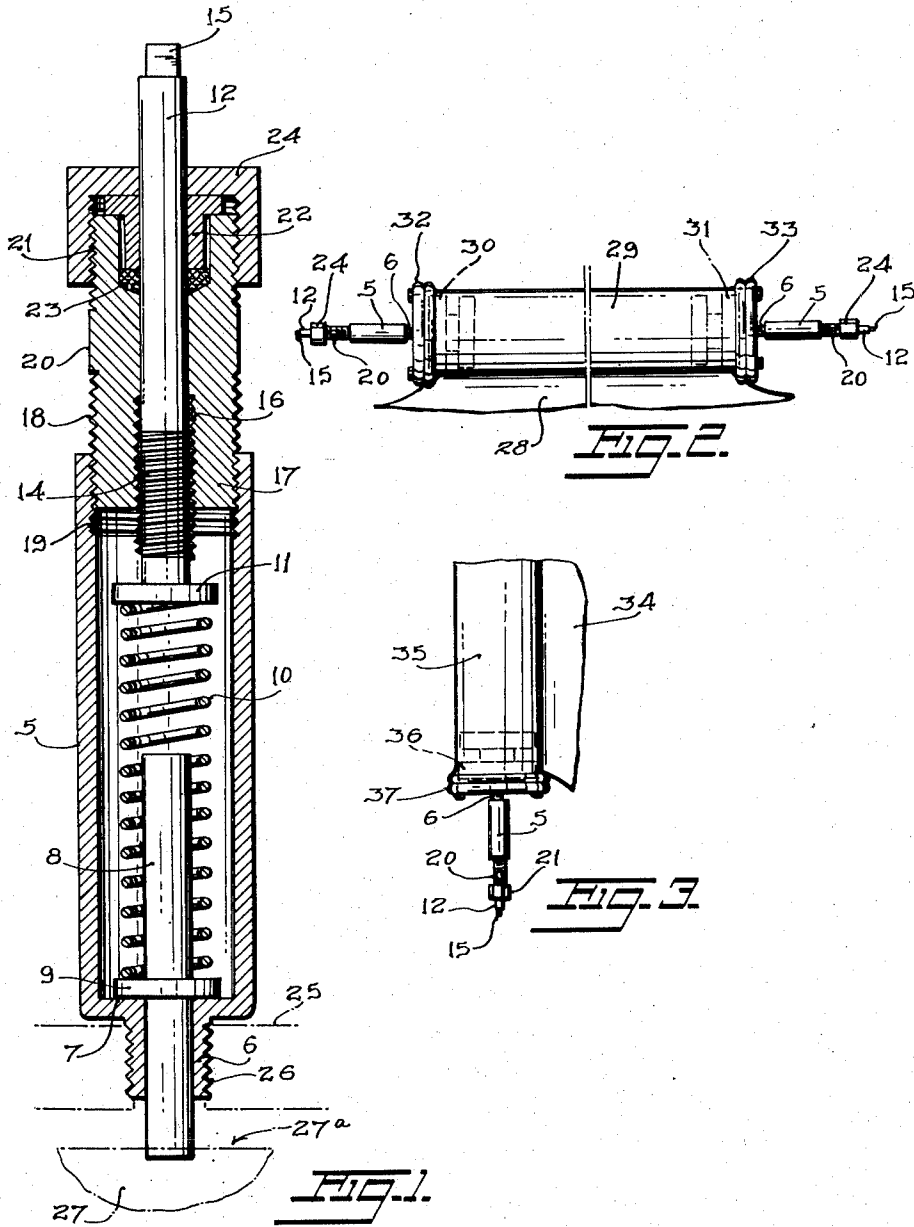
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A. G. SAMOTHRAKIS

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SPRING DEVICE

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INVENTOR.
ANTONIOS G. SAMOTHRAKIS
BY
John H. Schaefer
ATTORNEY

UNITED STATES PATENT OFFICE

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SPRING DEVICE

Antonios G. Samothrakis, Brooklyn, N. Y.

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This invention relates to new and useful improvements in piston mechanisms, and, more particularly, the aim is to provide a novel and valuable auxiliary device for acting as a mechanically-functioning booster, by displacing the reciprocating piston of a piston valve from a dead position assumed by said piston at the end of a working stroke and due to escape of steam from an intended place of confinement thereof relative to the piston.

When such a steam-escape condition exists, with the result that the piston assumes a dead position, the piston stops working. By the present invention, cessation of working of the piston cannot occur, even under the condition mentioned. The piston displacement effected by the device of the invention is such as to move the piston, by mechanical thrust, from its dead position; such thrust positively forcing the piston to start to make its stroke in the direction opposite to the direction of its stroke in approaching said dead position.

While the invention has been especially devised for overcoming a hitherto encountered trouble in liquid pumps, and, more specifically, and actually in marine installations, to wit, for a water feed pump and for a feed-water circulating pump for an auxiliary condenser, it is to be understood that the invention is not thus to be limited; since, as will become apparent hereinafter, the principles of the invention may be usefully applied to any steam-operated reciprocating piston in whatever relation the same may be functioning.

The object of the invention is to provide an appliance which is simple, inexpensive to construct and assemble, which has comparatively few parts yet which is rugged and reliable in operation, which nevertheless may be readily readjusted from an always readily accessible point of adjustment, which as a whole is very compact and entirely self-contained, and which, because of its attributes as just recited, may be expeditiously added to a pump or the like already manufactured and in service. In the last connection, it is also contemplated that the new adjunct may be inbuilt in a pump or the like as originally made.

Thus, in attaining the object above-mentioned, another object of the invention is attained, that is, to avoid the inclusion of elaborate extra linkages, the use of bell-cranks or other moving parts requiring large fields of operation, the resort to a plurality of differentially acting springs, the use of a spring on such parts as connecting rods from a crank-shaft or on analogous parts having to be assembled deep in the interior of the main apparatus, etc., etc.

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For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

Fig. 1 is a view, largely in axial section, showing an embodiment of the new adjunct as now favored.

Fig. 2 shows fragmentarily, and largely diagrammatically, portions of a water pump of the type wherein the piston valve cylinder is horizontally extended; with two of the devices of Fig. 1 applied thereto.

Fig. 3 is a view similar to Fig. 2, but in regard to a type of pump wherein the piston valve cylinder is vertically extended; with a single one of the devices of Fig. 1 applied thereto.

Referring to the drawing in detail, and first to Fig. 1, the new device is illustrated as including a cylindrical casing 5 having a reduced neck 6. Said casing, internally thereof, and at its end adjacent to the root of the neck 6, presents an annular shoulder 7 in a plane perpendicular to the axis of the casing. A cylindrical rod 8 integrally carries, intermediate its ends, a collar 9; and this rod, at its portion inserted into the neck 6, is of a diameter sufficiently close to that of the bore through said neck to allow easy endwise movement of the rod 8 relative to the neck, thereby to allow slight movement of the collar 9 toward and away from the shoulder 7.

The collar 9 is normally urged to bear against the shoulder 7 by an expansile spring 10 sleeving the upper part of the rod 8 and resting at one end against the collar 9.

The opposite end of said spring is engaged by a disk 11 integrally carried at one end of a rod 12 which in the main is smoothly cylindrical. The rod 12 is smoothly cylindrical except at the location of the disk 11, except at a portion along the length of the rod where the same has an external thread 14, and except at the outer end of the rod 12, where the same is polygonal in cross-section, at 15, to facilitate turning of the rod by means of an applied wrench.

The thread 14 of the rod 12 is in engagement with an internal thread 16 extending along a part of the length of a central cylindrical bore through a cylindrical block 17. This block has an external thread extending along an end portion of its length, this thread in engagement with an internal thread 19 of the casing 5 at the end thereof remote from the neck 6.

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With the block 17 screwed into the casing 5, tightly, to lock these parts together, the rod 12 may be turned at its polygonal portion 15 thereby to be spirally advanced or retracted, to modify the tension of the spring 10 as a particular situation may require. For tightening up the joint of the block 17 and the casing 5, said block, at a point intermediate its ends, has a portion 20 polygonal in cross-section.

The outer end of the block 17 has an external thread 21, and opposite such thread the block is recessed as shown for the reception of a gland 22 including a steam packing 23; the gland being held steam-tight by application of a nut 24 engaging the thread 21.

At 25 in Fig. 1 there is indicated the conventional plate for an end of a piston valve cylinder; which end plate is centrally drilled and tapped for taking the external thread 26 provided on the neck 6.

The portion of the rod 8 which passes through said neck is made of such length, in terms of the spacing of the shoulder 7 from the position 27^a reached by the adjacent face of the piston 27 when the latter arrives at the end of its stroke toward the end plate 25, that just before said piston face reaches said position the rod 8 will be thrust in a direction abnormally to tension the spring 10. Therefore, such abnormal tension is in the spring 10 at the instant the piston reaches the position 27^a, which would be a dead position of the piston if there were such steam escape as to prevent the steam-drive impetus now necessary to be applied to the piston to cause it to initiate its return stroke. However, with the device of the invention installed as explained, the return stroke of the piston is always certainly initiated.

Referring to Fig. 2, where is partially shown a pump 28 having a piston valve cylinder 29 extending horizontally, the position of the piston in said cylinder at the end of a working stroke in one direction is indicated in broken lines at 30 and the position of said piston at the end of a working stroke in the opposite direction is indicated in dot and dash lines at 31. Here, it would be desirable if not essential to provide two of the devices of Fig. 1, secured respectively to the end plates 32 and 33 of the cylinder 29 according to the principles explained in connection with the cylinder end plate 25 and the piston 27 of Fig. 1.

Referring to Fig. 3, where is partially shown a pump 34 having a piston valve cylinder 35 placed vertically, the position of the piston in said cylinder at the end of its downward working stroke is indicated in broken lines at 36. Here it would be necessary merely to provide one of the devices of Fig. 1, applied as just mentioned to the bottom end plate 37 of the cylinder 35. In such a pump, the booster effect of the device of the invention is needed only at the bottom of the piston valve cylinder, since any tendency of the piston to come to a dead position at the end of its upward working stroke is overcome, even with a steam-escape condition, by the weight of the piston.

In Figs. 2 and 3, no attempt has been made to show further details of the pumps there illustrated, as these are well-known. Also, the shape and nature of the pistons indicated is merely illustrative, and cannot affect the essence of the invention.

A device pursuant to the present invention, and according to the embodiment thereof herein

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shown and described, has actually been installed and tested, for instance in the case of a disabled circulation pump for an auxiliary condenser, said pump having a piston valve cylinder of the type indicated in Fig. 3, on the steamship Milton B. Medary, and in an emergency while on a voyage from Galveston, Texas, to Antwerp, Belgium, and for another instance, in the case of a disabled water feed pump having a piston valve cylinder of the type indicated in Fig. 2, on the steamship Marjory, on another voyage, and also in an emergency; in both cases, with perfect results. The piston of a piston valve frequently, from wear or otherwise, becomes loose in its cylinder, thereby allowing steam pressure to pass around the piston from one end of the cylinder to the other, and so causing the pump to stop on the piston reaching an end of the cylinder. The device of the invention, as simple and as readily applicable in an emergency as it is, starts such a pump working again and thereafter maintains it continuously in working condition.

While I have illustrated and described the preferred embodiment of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

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

1. A device for the purpose described, comprising a casing, attaching means at one end of the casing, said one end having an opening, a rod in said casing and endwisely movable therein for projection through said opening, and a spring in said casing for acting against said rod to normally maintain the latter projected through said opening, said attaching means comprising an external thread on said casing, said casing having a reduced neck carrying said thread, said casing having an internal shoulder adjacent the root end of said neck, said rod intermediate its ends having a collar fixed thereon, said spring at one end bearing against the face of said collar remote from said shoulder, a second rod bearing against the other end of said spring, and a bored block threadedly adjustable in said casing at its end remote from said neck, said second rod threadedly passing through the bore of said block and having the end thereof opposite to its spring engaging end projected beyond the outer end of said block so as to present, beyond the end of the casing remote from said neck, a part of said second rod readily accessible for turning to spirally move said second rod relative to said block for modifying the tension of said spring.

2. A device for the purpose described, comprising a casing, attaching means at one end of the casing, said one end having an opening, a rod in said casing and endwisely movable therein for projection through said opening, and a spring in said casing for acting against said rod to normally maintain the latter projected through said opening, said attaching means comprising an external thread on said casing, said casing having a reduced neck carrying said thread, said casing having an internal shoulder adjacent the root end of said neck, said rod intermediate its ends having a collar fixed thereon, said spring at one end bearing against the face of said collar remote from said shoulder, a second rod bearing against

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the other end of said spring, a bored block thread-
edly adjustable in said casing at its end re-
mote from said neck, said second rod thread-
edly passing through the bore of said block and
having the end thereof opposite to its spring en-
gaging end projected beyond the outer end of
said block so as to present, beyond the end of the
casing remote from said neck, a part of said sec-
ond rod readily accessible for turning to spirally
move said second rod relative to said block for
modifying the tension of said spring, and a
steam-tight closure between said second rod and
said block.

3. A device for the purpose described, compris-
ing a casing, attaching means at one end of the
casing, said one end having an opening, a rod in
said casing and endwisely movable therein for
projection through said opening, and a spring in
said casing for acting against said rod to nor-
mally maintain the latter projected through said
opening, said attaching means comprising an ex-
ternal thread on said casing, said casing having
a reduced neck carrying said thread, said casing
having an internal shoulder adjacent the root end
of said neck, said rod intermediate its ends hav-
ing a collar fixed thereon, said spring at one end
bearing against the face of said collar remote
from said shoulder, a second rod bearing against
the other end of said spring, a bored block thread-
edly adjustable in said casing at its end remote
from said neck, said second rod threadedly pass-
ing through the bore of said block and having the

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end thereof opposite to its spring engaging end
projected beyond the outer end of said block so
as to present, beyond the end of the casing re-
mote from said neck, a part of said second rod
readily accessible for turning to spirally move said
second rod relative to said block for modifying
the tension of said spring, and a steam-tight clo-
sure between said second rod and said block, said
closure including a packing gland in the block
and surrounding said second rod, and a tighten-
ing nut for said gland.

ANTONIOS G. SAMOTHRAKIS.

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