July 15, 1952 C. C. MITCHELL 2,603,190

CYLINDER AND PISTON CONSTRUCTION

Filed July 7, 1949 2 SHEETS—SHEET 1

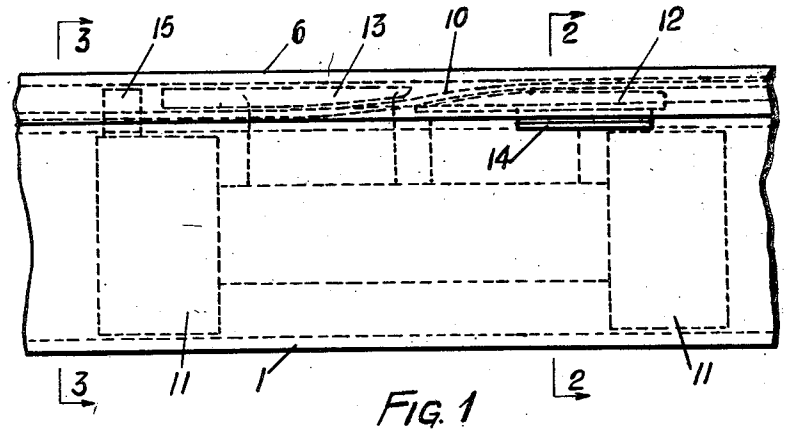


FIG. 1

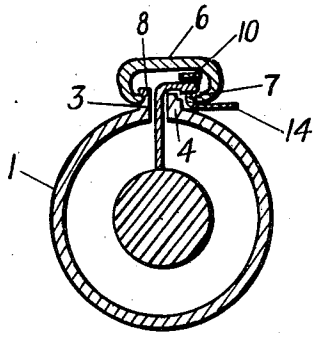


FIG. 2.

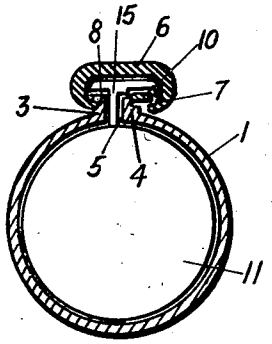


FIG. 3.

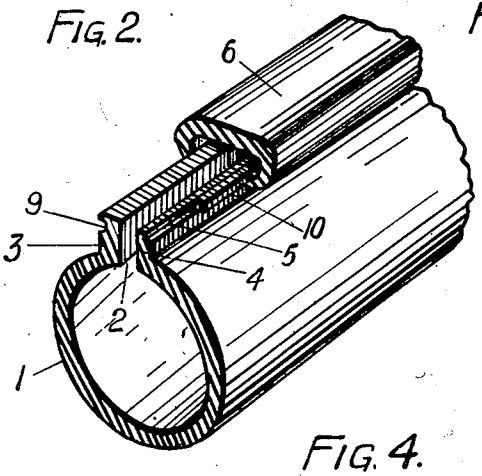


FIG. 4.

Inventor
Colin Campbell Mitchell
by Pennie, Edmonds, Morton and Barrows
Attorneys

July 15, 1952 C. C. MITCHELL 2,603,190

CYLINDER AND PISTON CONSTRUCTION

Filed July 7, 1949 2 SHEETS—SHEET 2

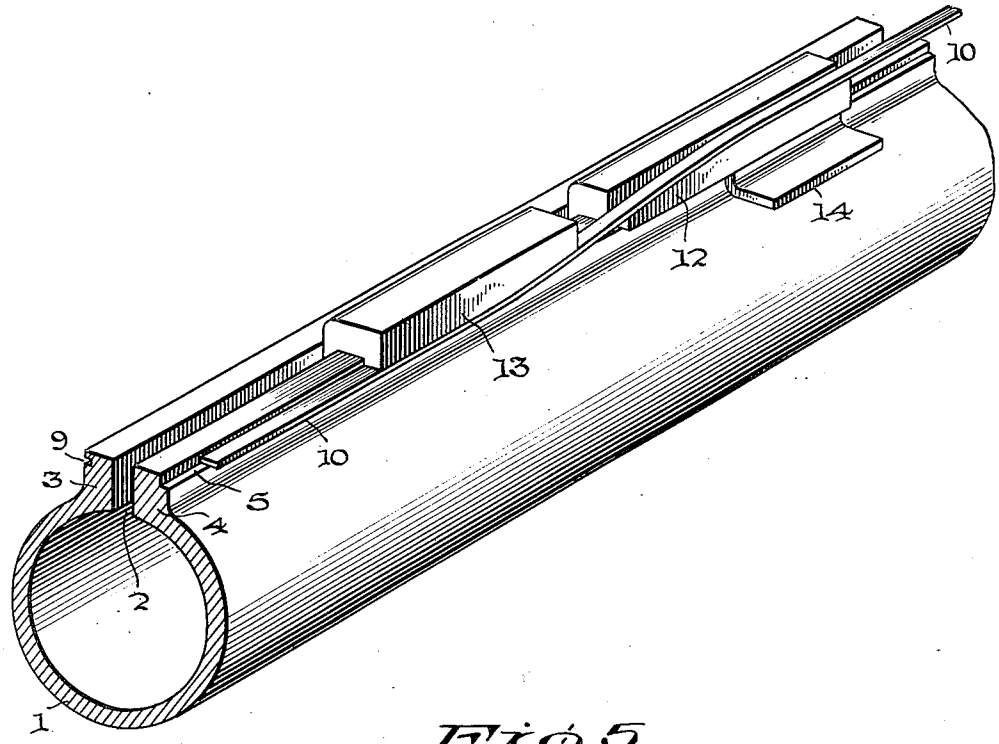


Fig. 5.

INVENTOR.
COLIN C. MITCHELL
BY
Pennie Edmonds Morton Barrows
ATTORNEYS

Patented July 15, 1952

2,603,190

UNITED STATES PATENT OFFICE

2,603,190

CYLINDER AND PISTON CONSTRUCTION

Colin Campbell Mitchell, Edinburgh, Scotland, assignor to Brown Brothers & Co. Limited, Edinburgh, Scotland, a company of Great Britain and Northern Ireland

Application July 7, 1949, Serial No. 103,520
In Great Britain June 12, 1948

8 Claims. (Cl. 121—1)

1

This invention relates to a cylinder and piston construction of that type in which the cylinder wall is slotted and the piston is provided with an actuating member projecting through the slot and adapted in its travel axially of the cylinder to impart movement to a body exterior to the cylinder.

Heretofore it has been necessary to surround the cylinder by a heavy framing of horseshoe shape in cross section in order to restore the strength and rigidity forfeited by the slotting of the cylinder wall.

An object of the invention is to dispense with such framing and thereby to effect a substantial saving in weight.

A cylinder and piston construction according to the invention comprises a cylinder, the wall of which is formed with a longitudinal slot, the marginal portions of the wall bounding the slot each presenting an upstanding longitudinal flange, one flange side remote from the slot being stepped, a flexible bridging strip normally resting on the shoulder of the step, a clamp member substantially of C-shape in cross section embracing the two flanges, one tip of the clamp member abutting against the unstepped flange, and the inner edge of the other tip of the clamp member being stepped to engage one edge of the flexible bridging strip and being spaced from the adjacent flange, the bridging strip substantially filling the gap between said second-mentioned tip of the clamp member and said stepped flange, a main piston slidable in said cylinder, means connected to said piston to flex the strip and raise an adjacent portion of it away from the shoulder of the stepped flange and from the second-mentioned tip, an actuating bar movable with said piston and projecting through the gap presented by the raised portion of the strip to the exterior of the cylinder, said bar being connectible to mechanism to be operated by movement of said piston, means connected to said piston to press said strip back into place after passage of the means to flex said strip, and a sealing piston slidable within the clamp member and connected to said main piston, said sealing piston conforming in shape to the interior profile of the clamp member.

The means to flex the bridging strip and to press it back into the checks may be shoes connected to the main piston and bearing against opposite faces of the strip.

The flange against which one tip of the clamp member abuts may be formed with a longitudinal groove of semi-circular cross section, the end of

2

the abutting tip of the clamp member being rounded to mate with said groove. Alternatively, said last-mentioned flange may present a longitudinal ridge engageable with a longitudinal groove of semi-circular cross section formed in the clamp member.

A practical embodiment of the invention is illustrated in the accompanying drawings in which Fig. 1 is a side view of a portion of a cylinder, Fig. 2 is a section through 2—2 in Fig. 1, Fig. 3 is a section through 3—3 in Fig. 1, Fig. 4 is a perspective view of a portion of a cylinder dissected to show the sealing strip, and Fig. 5 is a perspective view of a larger portion of the cylinder with the clamp omitted to show the shoes.

In the drawings 1 denotes the cylinder slotted longitudinally at 2. 3 and 4 denote upstanding flanges bounding the slot 2, one edge of the flange 4 being stepped at 5. 6 denotes a clamp member substantially of C-shape in cross section, the inner edge of one tip of the clamp member 6 being stepped at 7, and the other tip being rounded at 8 to engage a groove 9 of semi-circular cross section formed in the flange 3. 10 denotes a flexible bridging strip engageable with the steps 5 and 7. 11 denotes a main piston slidable in the cylinder 1; 12 denotes a shoe connected to the piston 11 and adapted to raise the adjacent portion of the strip 10 out of the steps 5 and 7, and 13 denotes a second shoe, connected to the piston 11 and adapted to press the strip 10 into the checks 5 and 7. 14 denotes an actuating bar fixed to the shoe 12, said bar being connectible to mechanism to be operated by movement of the piston 11. 15 denotes a sealing piston connected to the piston 11 conforming in shape to the interior profile of the clamp member 6 and slidable within the clamp member 6.

In practice, the power stroke of the main piston 11 is to the right as viewed in Fig. 1. As the piston 11 moves to the right, the shoe 12 moving with the piston 11 flexes the adjacent portion of the strip 10 and raises it from the shoulders of the steps 5 and 7. The actuating bar 14 moving with the piston operates the mechanism to which it is connected. The shoe 13 moving with the piston 1 in the wake of the shoe 12 presses the strip 10 against the steps 5 and 7, and the sealing piston 15 also moving with the main piston 11 prevents pressure fluid in the left hand end of the cylinder from escaping along the clamp member to the right hand end of the cylinder. The higher the pressure in the left hand end of the cylinder 1, the more effective is

the sealing action of the strip 10. When the cylinder 1 is under pressure, the slot 2 tends to widen, the strip 10 being thus jammed between the flange 4 and the adjacent tip of the clamp member 6. Additionally, the pressure of the fluid in the left hand end of the cylinder urges the strip 10 further into engagement with the steps 5 and 7.

What is claimed is:

1. In a cylinder and piston construction in which the wall of the cylinder has a longitudinal slot in which an actuating member operated by the piston moves, a pair of outstanding longitudinal flanges extending lengthwise of said cylinder and bounding the edges of said slot, a clamping member extending longitudinally of the slot and having one portion thereof bearing against a first one of said flanges and a second portion thereof adjacent but spaced from a second one of said pair of flanges to provide a gap between said second portion of the clamping member and said second flange through which a portion of the actuating member may extend, a bridging member adapted to fit into said gap, means operated by the piston to move the portion of the bridging member adjacent the portion of the actuating member which extends through the gap out of the gap, and other means operated by the piston to move the bridging member back into the gap after passage of the actuating member.

2. The apparatus defined in claim 1 in which said second flange has a step formed on the side remote from the slot and the bridging member lies upon the shoulder of said step over at least part of its length.

3. The apparatus defined in claim 2 in which the clamping member is substantially C-shaped in cross-section, and said second portion of the clamping member has a step formed thereon, the bridging member lying against the shoulder of the step of the clamping member over at least a part of its length.

4. The apparatus defined in claim 1 in which both of said means operated by the piston are shoes connected to the piston by means extending through the slot, the shoe of the first-mentioned means operated by the piston having a face bearing against one side of the bridging member to force the bridging member out of said gap and the shoe of said other means operated by the piston having a face bearing against the opposite side of the bridging member to force the bridging member into the gap.

5. The apparatus defined in claim 1 having sealing means for preventing escape of fluid through the slot from one side of the piston to the other side thereof, said sealing means being

movable lengthwise of said cylinder by movement of the piston.

6. The apparatus defined in claim 5 in which said sealing means is slidable within the clamping member and conforms in shape to the inner face thereof.

7. In a cylinder and piston construction in which the wall of the cylinder has a longitudinal slot in which an actuating member operated by the piston moves, a pair of outstanding flanges integral with said cylinder, the opposing faces of said flanges bounding the longitudinal edges of the slot, a clamping member substantially C-shaped in cross-section extending longitudinally of the slot and having one of its lateral extremities bearing against a first one of said pair of flanges and having its lateral extremity remote from the first-mentioned lateral extremity adjacent but spaced from a second one of said pair of flanges to provide a gap between said remote lateral extremity of the clamping member and said second flange through which a portion of said actuating member may extend, said second flange having a step formed on the face remote from the slot and said remote lateral extremity of the clamping member having a step formed thereon, a bridging member adapted to fit into and substantially close said gap, said bridging member lying against the shoulder of the step formed on the second flange and the shoulder of the step formed on said remote extremity of the clamping member, a first shoe connected to the piston and having a face thereof adapted upon movement of the piston to move the portion of the bridging member adjacent said portion of the actuating member out of the gap, and a second shoe connected to the piston and having a face thereof adapted upon movement of the piston to move the bridging member back into the gap after passage of the actuating member.

8. The apparatus defined in claim 7 which has a sealing block connected to the piston and positioned adjacent said second shoe, said sealing block conforming in shape to the interior outline of the clamping member to prevent passage of fluid from one side of the piston to the other.

COLIN CAMPBELL MITCHELL.

REFERENCES CITED

The following references are of record in the file of this patent:

FOREIGN PATENTS

Number	Country	Date
470,088	Great Britain	Aug. 3, 1937
471,055	Great Britain	Aug. 27, 1937