A push-pull jack for use in either pushing apart or pulling together two rigid members. The jack includes a cylinder, a piston in the cylinder and means for admitting air or a fluid under pressure into the cylinder to move the piston in either direction in the cylinder. A flat jaw is secured to one end of the cylinder, and a Z-shaped jaw is secured to the end of a piston rod extending from the other end of the cylinder. The Z-shaped jaw is mounted on the piston rod so that it can be positioned either with its working arm being spaced from the other jaw or with its working arm being spaced from the end of the cylinder and closely spaced from the other jaw.

10 Claims, 4 Drawing Figures
The present invention relates to a push-pull jack for use in either pushing apart or pulling together two rigid members. Police and firemen are often confronted with the problem of having to push apart or pull together two members which are too rigid to permit this being done manually. For example, when an elevator becomes broken down it may be necessary to pry open the doors of the elevator to permit removal of persons trapped in the elevator. When there is a fire in a building, it may be necessary to pry apart or pull together protective bars or grill work on the windows or doors of the building to permit access to the building. Sometimes people become trapped in vehicles as a result of an accident and it is necessary to pry apart parts of the vehicle to remove the person. For such occurrences it is desirable to have an apparatus which can be used to either push apart or pull together the rigid members as may be required. Not only should the apparatus be capable of either pushing or pulling, but should have a large span of movement so that members close together can be pushed far apart and vice versa. In addition, the apparatus should be relatively small so that it can be easily carried to any place that it must be used.

It is, therefore, an object of the present invention to provide a novel jack apparatus.

It is another object of the present invention to provide a jack which can be used to either push apart or pull apart rigid members.

It is a further object of the present invention to provide a push-pull jack which is relatively small so that it can be easily carried yet will push apart or pull together two rigid members over a large span of distance.

These objects are achieved by a jack which includes a cylinder, a piston in the cylinder, a piston rod connected to the piston and extending from one end of the cylinder, and means for moving said piston in either direction in the cylinder. A flat jaw is mounted on the other end of the cylinder, and a Z-shaped jaw is mounted on the end of the piston rod with a working arm of the Z-shaped jaw being substantially parallel to the other jaw. The Z-shaped jaw is mounted on the piston rod so that it can be arranged either with the working arm being adjacent to the cylinder and close to the other jaw, or with the working arm being spaced beyond the one end of the cylinder and spaced a distance from the other jaw.

The foregoing and other objects of the invention will become more apparent as the following detailed description of the invention is read in conjunction with the drawings, in which:

FIG. 1 is a perspective view of the push-pull jack of the present invention;

FIG. 2 is a partially sectioned view taken along line 2-2 of FIG. 1;

FIG. 3 is a perspective view of the push-pull jack with the jaws rearranged; and

FIG. 4 is a perspective view of the push-pull jack with the jaws in still another arrangement.

Like reference numerals designate like parts throughout the several views.

Referring to FIG. 2 of the drawing, the push-pull jack of the present invention is generally designated as 10. The push-pull jack 10 comprises a cylinder 12 having inlets ports 14 and 16 through its side wall adjacent its opposite ends. Feed tubes 18 and 20 are connected to the inlet ports 14 and 16, respectively. The feed tubes 18 and 20 are adapted to feed either air or a liquid under pressure to the cylinder 12. A piston 22 is within the cylinder 12. A piston rod 24 is connected to one side of the piston 22 and extends longitudinally along the cylinder. The piston rod 24 has a threaded end 26 which projects from one end of the cylinder 12. A threaded hole 28 is provided in the other end of the cylinder 12.

A flat, rectangular jaw 30 is secured to the end of the cylinder 12 having the hole 28. The jaw 30 has a hole 32 therethrough adjacent one end. A bolt 34 having an enlarged head 36 extends through the hole 32 in the jaw 30 and is threaded in the hole 28 in the cylinder to secure the jaw to the cylinder. A pair of washers 38 are provided between the belt head 36 and the jaw 30. The jaw 30 projects radially beyond the cylinder 12.

A cylindrical adaptor 40 is mounted on the threaded end 26 of the piston rod 24. The adaptor 40 has a threaded hole 42 in the center of one side into which the piston rod end 26 is threaded. A threaded stud 44 projects from the center of the other side of the adaptor 40.

A Z-shaped jaw 46 is mounted on the adaptor 40. The jaw 46 has a mounting arm 48 which extends across the end of the cylinder 12, a working arm 50 which is parallel to but spaced from the mounting arm 48, and a connecting leg 52 which connects the arms 48 and 52, and extends parallel to the piston rod 24. The mounting arm 48 has a hole 54 therethrough which the adaptor stud 44 extends. A pair of washers 56 are provided between the mounting arm 48 and the adaptor 40. A nut 58 is threaded on the adaptor stud 44 to secure the jaw 46 to the adaptor 40.

In the use of the push-pull jack 10, if two parallel members which are spaced apart a distance less than the length of the cylinder 12 are to be pushed apart, the Z-shaped jaw 46 is mounted on the adaptor 40 with the connecting leg 52 extending along the side of the cylinder 12 and the working arm 50 being directly over the jaw 30 as shown in FIGS. 1 and 2. The jaw 30 and the working arm 50 of the jaw 46 are then placed between the members to be pushed apart. Air or a liquid under pressure is then admitted into the cylinder 12 through the feed tube 20, and the feed tube 18 is opened to the atmosphere. The air or fluid admitted into the cylinder 12 through the feed tube 20 and inlet port 16 engages the piston 22 and pushes it toward the other end of the cylinder. This movement of the piston 22 moves the jaws 30 and 46 apart. As the jaws 30 and 46 are moved apart, they engage the members and force the members away from each other. In this arrangement of the jaws 30 and 46, the members can be moved apart a distance equal to the stroke of the piston 22.

The push-pull jack 10 can also be used to pull together two members. If the two members to be pulled together are spaced apart a distance less than the length of the cylinder 12 plus the stroke of the piston 22, the jaw 46 of the jack 10 is mounted in the position shown in FIG. 1. If the two members are spaced apart a distance greater than the length of the cylinder plus the stroke of the piston 22, the jaw 46 is mounted in the position shown in FIG. 3. In either arrangement, the piston 22 is moved to the end of the cylinder 12 adjacent the adaptor 40 by admitting air or fluid into the cylinder through the feed tube 20 and opening the feed tube 18 to the atmosphere. The jaw 30 and the working arm 50 of the jaw 46 are then placed at opposite sides of the two members. Air or fluid under pressure is then admitted into the cylinder through the feed tube 18 and the feed tube 20 is opened to the atmosphere. The air or fluid moves the piston 22 along the cylinder 10 and thereby moves the jaws 30 and 46 closer together. As the jaws 30 and 46 are moved together they press against the members and pull them together.

FIG. 4 shows another arrangement of the push-pull jack 10. For this arrangement the nut 58 is loosened and the jaw 46 is rotated about the adaptor stud 44 so that the working arm 52 is not directly over the jaw 30. The nut 58 is then retightened to secure the jaw 46 in this position. This arrangement permits the jaws 30 and 46 to engage surfaces which are not in direct alignment, such as crossing bar members. The jaw 46 can be moved to any position around the cylinder 10 depending on the relative positions of the members to be pushed apart or pulled together.

Thus, there is provided by the present invention a jack which can be used either to push two members apart or to pull two members together. The jack can push apart the members from a position where the members are close together, i.e., a distance less than the length of the cylinder 12, to a position where the members are spaced apart to a distance greater than the length of the cylinder and the stroke of the piston.
Likewise, the jack can be used to pull together two members between such positions. In addition, the jack can be used to push apart or pull together two members even if the members are not in direct alignment.

What is claimed is:

1. A jack comprising a pair of jaws, and means having first and second ends connecting respectively said jaws and adapted to move said jaws away from and toward each other, one of said jaws being substantially Z-shaped and selectively secured in first and second positions with the first end of said connecting means adjacent one end of the jaw, said one jaw extending toward the second end of the connecting means when it is in its first position and extending away from the second end of said connecting means when it is in its second position.

2. A jack in accordance with claim 1 in which the connecting means comprises a cylinder, a piston in said cylinder, a piston rod secured to said piston and projecting from one end of the cylinder, and means for feeding air or a fluid into said cylinder adjacent the ends of the cylinder.

3. A jack in accordance with claim 2 in which one of the jaws is secured to the end of the piston rod, and the other of said jaws is secured to the other end of the cylinder.

4. A jack in accordance with claim 3 in which the Z-shaped jaw is secured to the end of the piston rod.

5. A jack comprising a pair of jaws; means connecting said jaws and adapted to move said jaws away from and toward each other; one of said jaws being substantially Z-shaped and secured to said connecting means adjacent one end of the jaw; said connecting means comprising a cylinder, a piston in said cylinder, and a piston rod secured to said piston and projecting from one end of the cylinder; means for feeding air or a fluid into said cylinder adjacent the ends of the cylinder; the Z-shaped jaw being secured to the end of the piston rod, and the other of said jaws being secured to the other end of the cylinder; and an adapter threaded on the end of the piston rod with the Z-shaped jaw being mounted on said adapter.

6. A jack in accordance with claim 5 in which the Z-shaped jaw has a pair of spaced, substantially parallel arms and a leg connecting said arms, one of said arms being mounted on said adapter.

7. A jack in accordance with claim 6 in which said adapter has a threaded stud extending therefrom, the said one arm of the Z-shaped jaw has a hole therethrough which through which the stud extends, and a nut is threaded on said stud to secure the jaw to said adapter.

8. A jack in accordance with claim 7 in which the other jaw is a flat plate secured adjacent one end to the other end of the cylinder and projecting radially beyond the cylinder.

9. A jack in accordance with claim 8 in which the other end of the cylinder has a threaded hole therein, the other jaw has a hole therethrough adjacent one of its ends, and a headed bolt extends through the hole in the jaw and is threaded in the hole in the cylinder to secure the jaw to the cylinder.

10. A jack in accordance with claim 9 including a pair of washers around said stud between the said arm of the Z-shaped jaw and the adapter, and a pair of washers between the head of the bolt and the other jaw.

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