

Oct. 15, 1963

O. O. KYTTA

3,106,759

NEW AND IMPROVED FASTENING MEANS

Filed Dec. 14, 1959

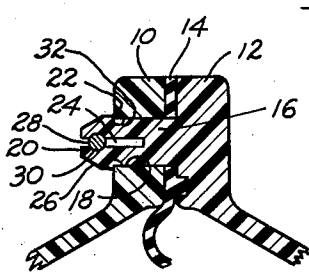
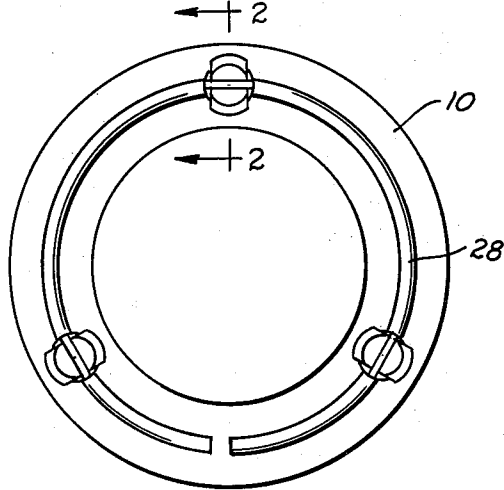


FIG. 1

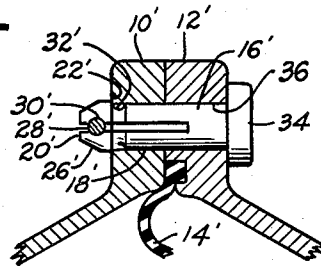


FIG. 2

FIG. 3

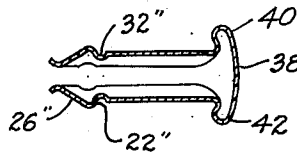
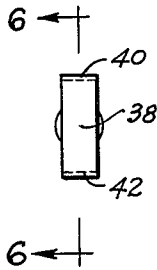
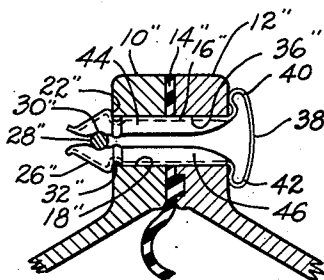


FIG. 4

FIG. 5

FIG. 6

INVENTOR.

OSWALD O. KYTTA.

BY

William P. Hickey

ATTORNEY.

1

3,106,759

**NEW AND IMPROVED FASTENING MEANS**

Oswald O. Kytta, South Bend, Ind., assignor to The Bendix Corporation, a corporation of Delaware  
 Filed Dec. 14, 1959, Ser. No. 859,338  
 6 Claims. (Cl. 24-205.17)

The present invention relates to new and improved fastening means; and more particularly to new and improved means for fastening two ring shaped structures together.

In some types of power braking units that are manufactured today, a premolded rubber diaphragm is clamped between a pair of members having a pair of juxtaposed abutment ring shaped surfaces.

An object of the present invention is the provision of a more simplified and inexpensive structure for clamping and holding the diaphragm between the juxtaposed members.

The invention resides in certain constructions and combinations and arrangements of parts; and further objects and advantages of the invention will become apparent to those skilled in the art to which it relates from the following description of the several preferred embodiments described with reference to the accompanying drawing forming a part of this specification, and in which:

FIGURE 1 is an end view of a couple of circular plates having a diaphragm clamped therebetween by means of the new and improved fastening structure of the present invention;

FIGURE 2 is a fragmentary cross sectional view taken approximately on the line 2—2 of FIGURE 1 and showing one embodiment of the invention;

FIGURE 3 is a cross sectional view similar to FIGURE 2 and showing another embodiment of the invention;

FIGURE 4 is a fragmentary cross sectional view similar to FIGURE 2 and showing still another embodiment of the invention;

FIGURE 5 is an end view of a portion of the structure shown in FIGURE 4; and

FIGURE 6 is a cross sectional view taken approximately on the line 6—6 of FIGURE 5.

In an effort to reduce the cost of power braking devices of the general type shown in the Earl R. Price Patent No. 2,818,710, it has been found feasible to make the front and rear half sections of the power piston of plastic; and as stated above, it is an object to provide cheaper and more simple means for fastening this type of structure together. It will be understood that the structure shown and described will have other applications, particularly where a resilient member, such as a diaphragm, is clamped between two rigid members such that a separating force is applied to the two rigid members at all times.

In the structure shown in the drawing, the front half section of the power piston shown in the above referred to patent is generally indicated at 10, and the rear piston section of the structure shown in the above referred to patent is generally indicated at 12. The outer edge of the diaphragm 14 is sandwiched between the annular outer edge of the piston sections 10 and 12 and is held in sealing engagement therewith by means of the novel structure of the present invention.

In the structure shown in FIGURES 1 and 2 of the drawing, the rear piston section 12 is, of course, made of plastic and is provided with a plurality of integral forwardly projecting shafts 16 (only three of which are shown) and which extend through aligned openings in the front piston section 10. The ends of the shafts 16 which project out of the front end of the openings in the front piston section 10 are generally headed as at 20 to

2

provide a radially outwardly extending shoulder 22 which engages the front end face of the front piston section 10. The distance between the shoulder 22 and the front face of the rear piston section 12 is provided with a length 5 which requires that the diaphragm 14 be compressed by a predetermined amount when the front piston section 10 and diaphragm 14 are sandwiched therebetween. The projecting, or headed ends 20 of the shafts 16 are slotted, as for example by a saw or screw slotting machine, to a depth which extends inwardly of the shoulder 20 by an amount which permits the slot separated sections of the shaft 20 to be bent together. Where both halves of the shaft are provided with a shoulder 22, the slot 24 is preferably of a width approximately twice that of the shoulders 22 so that the outer edge of the heads 20 can be forced through the openings 18 from the rear end face of the front section 10. To aid in this respect, the front end of the heads 20 are preferably tapered as at 26.

The sections 10 and 12 of the piston are subject to rapid reversal of forces, as by vibration, which in time would wear the shoulders 22 and thereby permit the heads 20 to be withdrawn out of the opening 18. To prevent this from happening, a circular wire 28 is wedged in the ends of the slots 24 of each of the shafts 16 to hold their shoulders 22 into firm engagement with the front face of the front piston section 10. Inasmuch as the shafts 16 are made of plastic which deforms slightly with time and pressure, the sidewalls of the slots 24 will deform accurately about the wire 28 to a slight degree to form recesses which help retain the wire 28. With materials which do not deform under time and pressure, it may be desirable to form arcuate recesses 30 in the sidewalls of the slots 24 for this purpose. Where this is done, it will be seen that the wire 28 being wider than the slots 24, will force the opposite halves of the heads 20 radially outwardly from their normal position while the wire 28 is being forced into the end of the slots; and in order to permit this to happen it may be preferable to form a slight groove 32 at the juncture of the shoulders 22 and the cylindrical section of the shafts 16. The grooves 32 permit adjacent section of the shafts 16 to yield with respect to the opposite halves of the head 20 during insertion of the wire 28.

The embodiment shown in FIGURE 3 of the drawing is generally similar to that shown in FIGURE 2; and those portions of FIGURE 3 which have corresponding portions in FIGURE 2 will be designated by a like reference numeral characterized further in that a prime mark is affixed thereto. The embodiment shown in FIGURE 3 differs principally from that shown in FIGURE 2 in that the shaft 16 is not formed integrally on the rear piston section 12', but is provided with a large head portion 34 which abuts the rear face of the rear piston section 12, and has a shaft section 16' which passes through an opening 36 in the rear piston section 12'. In the embodiment shown in FIGURE 3, the front and rear piston sections 10' and 12' are made of pot metal and the fastener structure shown in FIGURE 3 is also made of metal. The head 20' is intended to be forced through both of the openings 36 and 18' and the shoulders 22' snap into position in the same manner as described for the embodiment shown for FIGURE 2.

The embodiment shown in FIGURE 4 corresponds generally to that shown in FIGURE 3, but differs principally in that the headed fastener shown in FIGURE 4 is made from a bent piece of metallic strip 38. Those portions of the embodiment shown in FIGURE 4 which correspond to those of the other views carry the same reference numeral characterized further in that a double prime mark is affixed thereto. The center portion of the strip 38 is provided with oppositely facing bend-over por-

tions 40 and 42 to form shoulders for abutment with the rear face of the rear piston section 12" and the forwardly facing end portions of the strip 38 are generally arcuately bent to provide a stem portion 16" whose outer surface is in general engagement with the sidewalls of the opening 36" and opening 18". The projecting ends of the legs 44 and 46 are first rounded radially inwardly to provide the grooves 32", are thereafter deformed radially outwardly to provide the shoulders 22". The legs 44 and 46 are thereafter inclined inwardly to provide conical surfaces 26" which will spring the legs 44 and 46 together when they are inserted through the openings in the piston sections. Recesses 30" are provided in the adjacent edges of the legs 44 and 46 just forwardly of the shoulders 22" to retain the wire 28" when it is pressed into position. The strips 38 are used in the same manner as the fasteners shown in FIGURE 3, and they function in generally the same manner to provide generally the same results.

While the several embodiments have been described as using slotted shafts the opposite side sections of which both include a shoulder 22, it will be understood that in some instances only one shoulder need be provided to hold the structure together. Where only one shoulder is provided, the width of the slot 24 need only be approximately equal to the width of the shoulder 22 in order to permit the head 20 of the shaft to be inserted through the opening 18.

While the several embodiments of the invention have been described in considerable detail, I do not wish to be limited to the particular constructions shown and described; it is my intention to cover hereby all novel adaptations, modifications and arrangements thereof which come within the practice of those skilled in the art to which the invention relates.

I claim:

1. A fastening structure for a pair of members having ring shaped juxtaposed abutment portions at least one of which portions has a plurality of cylindrically shaped openings therethrough and comprising: a plurality of headed shafts projecting through said openings in said one of said members and retained by the other of said members from being pulled through said openings, the portions of said shafts which project out of said openings in said one of said members having radially outwardly extending shoulders of predetermined width and which abut the outer face of said one of said members surrounding its openings and the surface of each shaft between said shoulder and head being cylindrical in its normal condition to engage the sidewalls of said cylindrical openings when inserted therein, each of said projecting shaft portions also having a longitudinally extending slot of a width approximately twice said predetermined shoulder width, and an arcuately bent wire extending around and wedged in the slot of each of said shafts to hold their shoulders in engagement with said outer face of said one of said members.

2. A fastening structure for a pair of members having ring shaped juxtaposed abutment portions having a plurality of cylindrically shaped and aligned openings therethrough and comprising: a plurality of headed shafts the shaft portions of which project through said openings with their heads in engagement with one of said members and their shafts extending out of the opening in the other of said members, the portions of said shafts which

project out of said openings in said other one of said members having radially outwardly extending shoulders of predetermined width and which abut the outer face of said other one of said members surrounding its openings and the surface of each shaft between said shoulder and head being cylindrical in its normal condition to engage the sidewalls of said cylindrical openings when inserted therein, each of said projecting shaft portions also having a longitudinally extending slot of a width approximately twice said predetermined shoulder width, an arcuately bent wire extending around and wedged in the slot of each of said shafts to hold their shoulders in engagement with said outer face of said other one of said members, and each shaft having a recess in its cylindrical surface adjacent its shoulder to permit flexure of said shaft during insertion of said wire.

3. A fastening structure according to claim 1 and further characterized in that said shafts are integral with said portion abutting the portion having said cylindrical openings.

4. A fastening structure according to claim 1 wherein said shaft comprises a strip of sheet metal having oppositely facing radially outwardly extending folded over portions adjacent its center forming the shoulder portion of a head and which engages one of said abutment portions, and longitudinally extending leg portion of arcuately bent cross section which extend through and engage the sidewalls of said cylindrical openings, said leg portions extending out of the opposite end of said opening in the other one of said abutment portions and said projecting end portions of said legs having laterally outwardly turned portions providing shoulders for engaging the opposite end face of said other one of said abutment portions.

5. A fastening structure according to claim 3 and further characterized in that said integral shafts are recessed adjacent said shoulders to permit flexure of said shaft during insertion of said wire.

6. A fastening structure according to claim 2 wherein said shafts comprise:

a strip of sheet metal having oppositely facing radially outwardly extending folded over portions adjacent its center forming the shoulder portion of a head and which engages one of said abutment portions, and longitudinally extending leg portions of arcuately bent cross section which extend through and engage the sidewalls of said cylindrical openings, said leg portions extending out of the opposite end of said opening in the other one of said abutment portions and said projecting end portions of said legs having laterally outwardly turned portions providing shoulders for engaging the opposite end face of said other one of said abutment portions.

#### References Cited in the file of this patent

##### UNITED STATES PATENTS

531,363	Dinkelacker	Dec. 25, 1894
1,754,209	Carr	Apr. 8, 1930
2,440,341	Lehman et al.	Apr. 27, 1948
2,564,101	Dzus	Aug. 14, 1951

##### FOREIGN PATENTS

1,111,742	France	Nov. 2, 1955
569,618	Germany	Feb. 6, 1933