Feb. 25, 1936. J. P. EASTMAN 2,031,823

PRESSED-ON HOSE COUPLING

Filed April 20, 1934

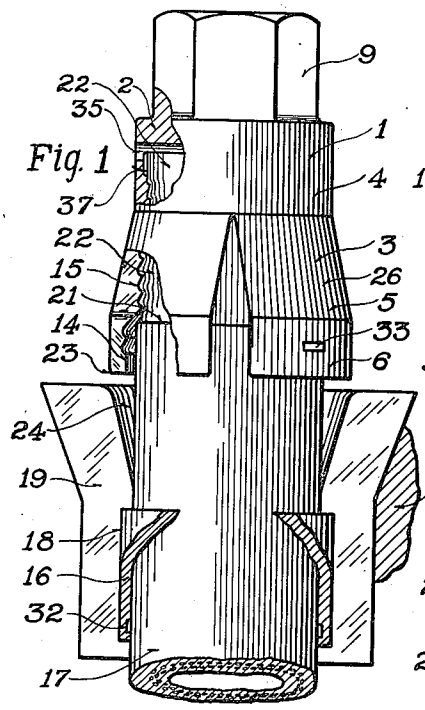


Fig. 1

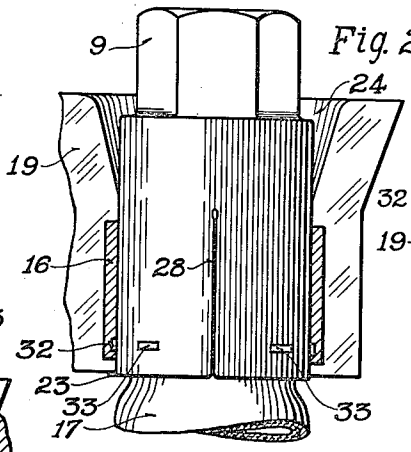


Fig. 2

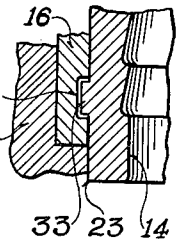


Fig. 4

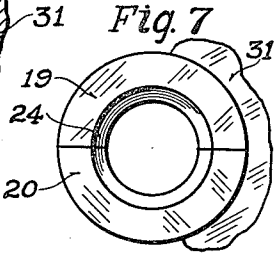


Fig. 7

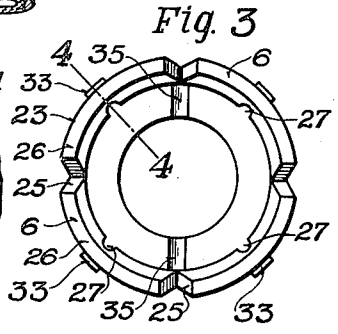


Fig. 3

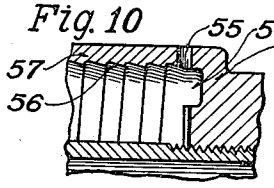


Fig. 10

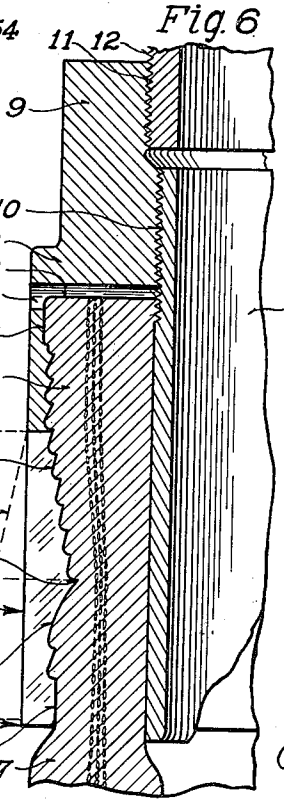


Fig. 6

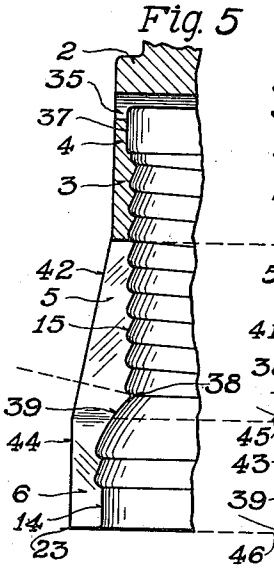


Fig. 5

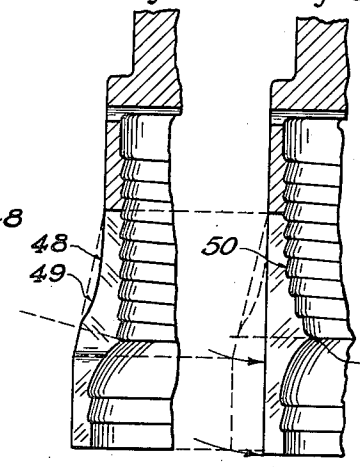


Fig. 8

Fig. 9

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PRESSED-ON HOSE COUPLING

Joseph Peter Eastman, Manitowoc, Wis.

Application April 20, 1934, Serial No. 721,517

6 Claims. (Cl. 285—84)

The invention relates to hose couplings, and particularly to that type of same known as pressed-on hose couplings, which are permanently attached to a hose by a contracting operation. It is an improvement upon the coupling described in my co-pending application, Serial No. 484,046.

The main improvement refers to the inwardly protruding ring which does not exist before contraction of the coupling but which is brought into existence by the act of contracting. That ring is the main feature of my said co-pending application. In the present application it is obtained by a somewhat different and more effective construction, as will hereinafter appear.

Another important improvement consists in slitting the sleeve of the coupling lengthwise, with V-shaped slits, or long narrow notches, to facilitate contraction, the strength to resist bursting strain being then supplied by an encircling band. This improvement greatly reduces the amount of pressure needed to effect the contraction.

As increasing the practicability of the preceding improvement, an improvement in the contracting dies has been made, whereby said dies are enabled to effect the contracting, and to place the band in position, all in one operation.

Another improvement provides overflow space, within the coupling itself, to receive material displaced from the hose in contracting.

And other improvements will appear in the course of the specification.

In general, these improvements are designed to meet the demand for couplings that will not blow off under ever increasing pressures, when attached to hose that is reinforced with braiding of hard springy wire.

In the drawing:—

Fig. 1 is a plan, partly in section, showing the parts assembled in readiness for contraction, the front half of the die being removed.

Fig. 2 is a plan showing the parts after contraction, the front half of the die being removed.

Fig. 3 is an end elevation of the mouth of the coupling before contraction, and before insertion of the hose.

Fig. 4 is a fragmentary cross section on line 4—4, Fig. 3, showing the interlocking of the band and sleeve.

Figs. 5 and 6 are sectional, broken away, plan views, respectively before and after contraction, the hose being removed in Fig. 5.

Fig. 7 is a plan view showing the split die.

Figs. 8 and 9 show a modification, they being sectional, broken away, plan views, respectively before and after contraction, the hose being removed in both cases.

And Fig. 10 shows another modification, that figure being a sectional, broken away, plan view, showing an alternative position for the relief recess.

Referring to the drawing, and describing first the preferred form, Figs. 1 to 6:—

Referring more particularly to Figs. 1, 3, and 5, which show the coupling before contraction:—

The coupling 1 has the end wall 2 with the sleeve 3 projecting therefrom.

Said sleeve 3 consists of the smaller bored cylindrical portion 4 nearest to said end wall, the intermediate portion 5, and the larger bored cylindrical portion 6, furthest from said end wall.

Said intermediate portion 5 is internally cylindrical and externally conical before contraction, Figs. 1, 3, and 5, whereby it constitutes, in effect, an annular wedge, having its apex toward said end wall 2.

The internal reinforcing tube 8, usually called the "insert", visible in Fig. 6 only, is present in all cases.

The hexagonal neck 9 extending from said end wall 2 gives a grip for a wrench, and is internally threaded at 10, Fig. 6, to receive said "insert" 8. Also it has the female thread 11, Fig. 6, to receive the male threaded end 12 of another coupling or of other equipment.

Internal rings 14 in said further cylindrical portion provide hose gripping means, while the coarse internal thread 15 in said intermediate portion 5 and in said nearer cylindrical portion 4 provide gripping means, while also they facilitate the insertion of the hose end.

Referring more particularly to Fig. 1. The band 16 is a length of strong metal tube. The end of the hose 17 is passed through it, and its lower half lies in the recess 18, in the lower half-die 19. The upper half-die 20, Fig. 7, not shown in Figs. 1 and 2, is similarly recessed, and receives the upper half of said band.

Said hose 17 is somewhat reduced in diameter at the shoulder 21, and the hose end 22, thus reduced, is screwed with difficulty into said threads 15.

Thereafter the process of contraction is as follows:—

The rim 23, of the bell-mounted extreme end of said sleeve 3, is entered into the tapered orifice 24 of the dies; and the coupling is forced into the die until the position shown in Fig. 2 is reached, during which process said sleeve is contracted inward until its bell-like external shape before

contraction, as shown in Fig. 1, has disappeared, and it has become cylindrical externally.

The four notches or tapered slits **25**, extending lengthwise of the sleeve through said furthest portion **6**, and through said intermediate portion **5**, divide said portions into **4** segments or tongues **26**, extending longwise of the sleeve.

In the construction shown in my co-pending application aforesaid, it is necessary to reduce the girth of a solid continuous ring of metal, which requires great pressure. The present notches **25** obviate the need for that pressure, thereby greatly facilitating said process of contraction. Also the longwise grooves **27** are provided, extending along the middle of the inside faces of said tongues **26**, which make it easier to bend said tongues to the sharper curves which they must assume during said contraction.

During said process of contraction, accordingly, said tongues **26** gradually approach each other until they meet along their edges in the straight line **28**, Fig. 2, closing up said notches **25**. And, during said process, the whole of the metal of said tongues **26** adjusts itself to the new shapes required of the tongues. But this the metal does without the great pressure that would have been needed if the notches had not been made.

When the contracting has been finished as described, leaving the parts in the relative positions shown in Fig. 2, the dies can be released from the annular die-block **31**. Said half-dies **19** and **20** can then be removed, and they will leave behind them said band **16** in position upon the sleeve, binding said tongues **26** tightly against the hose.

The groove **32** is provided on the inside face of said band, and the lugs **33** are provided on the outside of said sleeve. During the contraction, as soon as said lugs register with said groove, they spring into the same, due to the outward pressure of the hose substance, and they thereby lock said band against any possible displacement in the axial direction.

Vents **35** are provided communicating between the end **36** of the hose, Fig. 6, and the outer air.

In addition to said vents **35**, the annular recess **37** is provided, chamber out in the inside wall of the sleeve, and in communication with said vents for the following purpose:—

It is found in practice that space, close at hand, for a portion of the hose substance displaced during contraction to escape into, is imperative, for which purpose the vents are not adequate. The present annular chamber is therefore provided. When the reduced hose end **22** is screwed into the threads **15** as hereinbefore described, it butts against said end wall **2**, but leaves said recess **37** unfilled for the time being, see Figs. 1 and 5. But, after contraction, said recess **37** is filled, as is shown in Fig. 6; or it may be only partly filled.

Said recess **37** therefore relieves what is, in effect, equivalent to a fluid pressure, exerted by the substance of that portion of the hose which is imprisoned at the inward end of the coupling, by the process of contraction. Said vents **35** are then left to carry out chiefly the following duties, namely, first, to allow air to escape while the hose end is being screwed in, before contraction; and, later, to allow any water or other fluid, which may leak back through said threads **10** of said reinforcing tube or "insert" **8**, to escape to the outer air, thereby preventing said leakage from building up a back pressure at the end of the hose.

Referring more particularly to Figs. **5** and **6**.

The edge **38** marks the further end of the inside wall of said intermediate portion **5** of the sleeve, the word "further" here meaning further from said end wall **2**. Before contraction, as shown in Fig. 5, said edge **38** is the beginning of the cylindrical threading **15** aforesaid which receives the end of the hose as hereinbefore described. But, after contraction, as shown in Fig. 6, said edge **38** has become the apex of an inwardly protruding annular ring biting into the substance of the hose to grip the hose.

Said inwardly protruding ring is one of the main features of the present construction, as was a corresponding ring in my co-pending application. The curve **39**, however, which terminates said intermediate wedge-shaped portion **5** at its outward or thicker end, is a curve dictated by shop considerations, to reduce liability to fracture, and does not correspond with the cone which was provided in the corresponding location in my co-pending application aforesaid.

As compared with said earlier construction, the present one makes it possible to locate said edge **38** further from said end wall **2**, whereby after contraction, said edge **38** protrudes more deeply inward, and is consequently more effective as a grip.

As showing more clearly the changes in shape which are caused by the contraction, the dotted line **41**, Fig. 6, corresponds with the line **42**, Fig. 5, and shows the shape before contraction; while, similarly, the dotted line **43**, Fig. 6, corresponds with the line **44**, Fig. 5. The curved arrows **45** and **46** then show the path of the contraction.

Figs. 8 and 9 show a modification. They are views before and after contraction respectively. In this modification, the curved line **48**, Fig. 8, takes the place of the straight line **42** of Fig. 5. Opposite the belly **49** of said curve **48** the contraction is therefore less than in the corresponding location in Fig. 5, whereby, after contraction, turning to Fig. 9, the inside line **50** is a curve, in contrast with the inside line **51** in Fig. 6, which is substantially straight. This construction gives added sharpness to the inwardly protruding ring **52**, Fig. 9. The object in showing this modification is to show that the inward ring can be made more pronounced by suitably hollowing the outside of the annular wedge of the preferred form.

Fig. 10 shows a modification in which the annular recess **53**, chambered out from the end wall **54**, and in communication with the vent **55**, takes the place of the recess **37**, Figs. 1, 5, and 6, for the purpose of allowing relief as hereinbefore described. In such case the threads **56**, on the inside of the near portion **57** of the sleeve of the coupling, are preferably continued until they meet said end wall **54**.

I claim:

1. A hose coupling comprising an end wall, a sleeve, and an internal reinforcing tube, said sleeve and tube projecting from said end wall and forming therewith an annular chamber adapted to receive the end portion of a hose, the extreme end of the hose then butting against said end wall, a recess being provided in the inner wall of said sleeve, open to said chamber, and adjacent said end wall, said recess being adapted to provide space for any portion of the substance of the hose which may be displaced when said sleeve is contracted to grip the hose.

2. A hose coupling comprising an end wall and a sleeve projecting therefrom, said sleeve being

adapted to receive the end of a hose, and to be contracted to grip the same, said sleeve comprising an upper portion in the form of an unbroken tube attached to said end wall, and a plurality of tongues, each such tongue being substantially in the form of a wedge when viewed in axial section with respect to the coupling, said wedges having their thin ends upward, attached to and extending downward from the lower edge of said tube, and having their inner faces substantially vertical before contraction, to admit the hose, said inner faces sloping inward after contraction, their lower ends thereby then gripping the hose, said inward sloping being due to said wedges having been bent inward at their thin ends aforesaid, during said contraction.

3. A hose coupling as claimed in claim 2, including also a band enclosing said tongues, to retain them in their inwardly-bent positions as aforesaid.

4. A hose coupling as claimed in claim 2, including also a skirt portion upon each wedge, integral therewith, thinner than the lower end of the wedge and located at the outer edge of said lower end, said skirt portions standing with their inner faces substantially vertical after contraction, to form a hose-engaging opening of larger diameter than that at the lower ends of the wedges.

5. In combination, a hose coupling and a band, said coupling comprising a sleeve adapted to receive the end portion of a hose and to be contracted to grip said portion, said band being adapted to be slid over said sleeve to retain it in contracted condition, a lug being provided upon said sleeve adapted to spring outward after at least a portion of the inner face of said band has slid over it, to retain said band against tendency to endwise displacement.

6. A hose coupling comprising a metallic sleeve to receive the end of a hose and to be contracted about said end to grip the same permanently, said sleeve comprising an upper portion in the form of an unbroken tube and comprising also a plurality of substantially non-resilient tongues rooted to said upper portion and extending downwardly therefrom, each such tongue including extra thickness of metal at a point spaced both from its said root and its free end, said tongues before such contraction sloping outward, thereby affording passage to said hose past said extra thicknesses of metal, whereas, after the contraction, the extra thickness of metal of each tongue is embedded in the substance of the hose, whereby said embedded portions jointly form a succession of co-operating intrusions around a portion of the hose end, to grip that portion the more intensely, and means for retaining such tongues permanently in their innermost hose-gripping positions, said means comprising a band of smooth cylindrical interior, permanently encircling the tongues.

JOSEPH PETER EASTMAN.