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Form 1
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COMMONWEALTH OF AUSTRALIA 596739

PATENTS ACT 1952

APPLICATION FOR A PATENT

14190/88

We, FREDERICK DUFFIELD PTY. LIMITED, of Beaumont Road, Mount Kuring-gai, New South Wales 2080, Australia, hereby apply for the grant of a Patent for an invention entitled:

"HOSE END FITTING"

which is described in the accompanying specification.

Our address for service is GRIFFITH HASSEL & FRAZER, 71 York Street, SYDNEY, N.S.W. 2000, Australia

DATED this 9th day of April, 1987.

FREDERICK DUFFIELD PTY. LIMITED
by its Patent Attorney

of GRIFFITH HASSEL & FRAZER

To: The Commissioner of Patents
Commonwealth of Australia

LODGED AT SUB-OFFICE
- 9 APR 1987
Sydney

COMMONWEALTH OF AUSTRALIA
PATENTS ACT 1952

DECLARATION IN SUPPORT OF A NON-CONVENTION APPLICATION FOR A PATENT

In support of the application made by FREDERICK DUFFIELD PTY. LIMITED for a patent for an invention entitled:

"HOSE END FITTING"

I, FREDERICK RUSSELL DUFFIELD of Beaumont Road, Mount Kuring-gai, New South Wales 2080, Australia, do solemnly and sincerely declare as follows:

1. I am authorised by the above mentioned applicant for the patent to make this declaration on its behalf.

2. The actual inventor is COLIN JAMES TAKEN of 20 Cowles Road, Mosman, New South Wales 2088, Australia and the applicant is entitled to make the application since the inventor made the invention for and on behalf of the applicant in the course of his duties as an officer of the applicant and under circumstances such that the applicant would, if a patent were granted on the basis of this application to the inventor, be entitled to have the patent assigned to it.

Declared at SYDNEY this 22nd day of April 1987.

FREDERICK RUSSELL DUFFIELD
Managing Director

The inventor, COLIN JAMES TAKEN, does hereby acknowledge that the applicant would be entitled to have assigned to it any patent granted to the inventor on the above invention.

Colin James Taken.

COLIN JAMES TAKEN

Declared at Sydney this 22nd day of April. 1987

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SWAGED HOSE END FITTING

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(72) Inventor(s)
COLIN JAMES TAKEN

(74) Attorney or Agent
GRIFFITH HACK & CO. SYDNEY

(56) Prior Art Documents
GB 2000840
GB 1212940
US 3539207

(57) Claim

1. A hose end fitting comprising a metal stem member which is intended to locate within the bore of a hose and a metal swage body which is intended to locate coaxially about the hose wall and to clamp the hose end onto the stem member under the influence of a swaging force; the swage body having an inwardly projecting circumferential flange forming a part of a nose portion at one end of the swage body, and the stem member being formed with a groove for receiving the flange when the swage body is swaged onto the hose end, the swage body being provided with a circumferential land which is formed about the nose portion, and the stem member and/or the swage body being formed with a region which accommodates the displacement of metal in the nose portion after the flange has been located within the groove by the application of an initial swaging force and a further swaging force is applied.

596739

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952 Form 10

COMPLETE SPECIFICATION

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Lodged:

Complete Specification–Lodged:
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Priority:

Related Art:

TO BE COMPLETED BY APPLICANT

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Complete Specification for the invention entitled:

"HOSE END FITTING"

The following statement is a full description of this invention, including the best method of performing it known to us:-

This invention relates to a hose end fitting of a type which is intended to be swaged onto the end of a wire reinforced hose. The end fitting has been developed primarily in order that a given fitting may be used with different types of hoses having different wall thicknesses.

Swaged type hose end fittings comprise a stem member and a ferrule or swage body. In assembling the fittings to the ends of the hose, the swage body is first located coaxially about the end of the hose and the stem member is forced into the bore of the hose. The entire assembly is then located within a swaging press and a swaging force is imposed on the assembly in a manner such that the swage body is reduced in diameter. This effects clamping of the hose, including the hose reinforcement wires, between the stem and the swage body. Also, the swage body is positively locked to the stem member during the swaging operation, this being achieved when a inwardly projecting flange at the front of the swage body is driven (i.e., swaged) into a mating groove in the stem member.

The above described fittings are used with various types of fluid (hydraulic and pneumatic) hoses and, whilst a single stem member may be used with different hoses which have the same size bore, different swage bodies have of necessity been manufactured to accommodate hoses having different wall thicknesses. For example, different size swage bodies have been provided for hoses having single and double wire braid reinforcements.

It has long been recognised that the inventory of component parts could be reduced significantly if it were possible to use a single swage body for two or more hoses having the same internal diameter but different wall thicknesses. However, it has not been possible to achieve this in the past because a swage body which is suitable for a thick walled hose would need be swaged inwardly to a greater extent to effect clamping of a thin walled hose. As a result, with the greater degree of swaging, the inwardly projecting flange which serves to lock the two fitting components together would move into the matching

groove before completion of the swaging operation and would damage the stem with continuation of the swaging operation to an extent sufficient to effect clamping of the thin walled hose.

The present invention seeks to avoid this problem by providing a hose end fitting which comprises a metal stem member which is intended to locate within the bore of a hose and a metal swage body which is intended to locate coaxially about the hose wall and to clamp the hose end onto the stem member under the influence of a swaging force. The swage body has an inwardly projecting circumferential flange forming a part of a nose portion at one end of the body and the stem member is formed with a groove for receiving the flange when the swage body is swaged onto the hose end. The end fitting is characterised in that the swage body is provided with a circumferential land which is formed about the nose portion, and in that the stem member and/or the swage body is/are formed with a region which accommodates the displacement of metal in the nose portion after the flange has been located within the groove by the application of an initial swaging force and a further swaging force is applied.

The end fitting is designed for use with at least two different types of hoses having similar internal diameters but different wall thicknesses and, therefore, requiring different amounts of body reduction to clamp the hose between the stem member and the swage body.

During assembly of the swage body to the stem member, the swage body is firstly swaged inwardly such that the flange locates within the groove and, at the same time, the major portion of the flange body is forced into contact with the hose. Thereafter, with application of a further swaging force, the swage body is swaged into more positive engagement with the hose and, at the same time, the circumferential land is displaced into the main body of metal forming the nose portion of swaged body. This displacement of metal results in a reduction of the force

that would otherwise be transmitted through the swaged body to the stem member and which would have a deforming influence on the stem member.

The assembly operation which has been described thusfar would represent the total operation if the end fitting were to be assembled to a thick walled hose. However, if it is to be secured to a thin walled hose, a further swaging force would need be applied to the swage body and it is under this condition that the region that accommodates the displacement of metal comes into play. The inclusion of such region permits the second stage swaging force to be applied, again without causing significant deformation of the stem member.

The region which accommodates the displacement of metal during the second stage swaging operation may be incorporated in the nose portion of the swage body. However, it is preferably provided in the groove in the stem member, by forming the groove with a width that is larger than the width of the flange. By so doing, the metal of the flange may be displaced (i.e., be caused to flow) in a longitudinal direction to occupy the otherwise vacant region in the groove and to avoid movement that would otherwise occur in an axially inward direction into the stem member.

The invention will be more fully understood from the following description of a preferred embodiment of a hose end fitting which is suitable for use with hoses having different wall thickness. The description is given with reference to the accompanying drawings in which:

Figure 1 shows a half sectional elevation side view of a prior art hose end fitting in the course of being assembled to a hose end;

Figure 2 shows the same prior art fitting which is illustrated in Figure 1 but in a condition following complete assembly to a hose end;

Figure 3 shows an end elevation view of a stem member portion of the hose end fitting in accordance with the preferred embodiment of the present invention;

Figure 4 shows a half-sectional elevation view of a swage body which is intended to be fitted to the stem member as shown in Figure 3;

Figures 5, 6 and 7 show a portion of the swage body which is shown encircled in Figure 4 and an adjacent portion of the stem member during three successive stages of assembly of the swage body to the stem member; and

Figure 8 shows five alternative configurations that may be employed in forming a nose portion of the swage body which is shown in Figure 4 of the drawings.

As illustrated in Figures 1 and 2, the prior art end fitting comprises a stem member 10 which is intended to locate within the bore of the hose 11 and which itself has a central through bore 12. The stem member is formed at its forward end (not shown) with a male or female connector portion and at its trailing end with a stem portion or tail 13. The stem portion 13 is formed along a major portion of its length with barbs 14 which in use grip the bore of the hose. A shoulder 15 is formed ahead of the stem portion 13 and the shoulder separates the stem portion from a circumferential groove 16.

A ferrule or swage body 17 is employed to clamp the end of the hose 11 to the stem member 10, and the swage body 17 may be regarded as being composed of 3 integral longitudinally spaced portions. That is, as shown in Figure 1, a nose portion 18 which functions to anchor the swage body to the stem member 10, a diametrically larger hose clamping portion 19 which functions to surround the hose and clamp the hose end to the stem member, and an inclined intermediate portion 20 which interconnects the nose and hose clamping portions. The hose clamping portion 19 of the swage body is formed internally with three circumferential barbs 21, which may extend annularly or helically, and which function to assist in anchoring the hose. When the swage body 17 is fully assembled to the stem member 10, as shown in Figure 2, the barbs 21 penetrate the outer casing of the hose 11 and deform the hose reinforcement to effect a positive locking engagement. The trailing end of the swage body 17 is

formed with a small barb or nib 22 which penetrates the outer casing of the hose to a small extent and which functions to prevent moisture ingress to the interior of the end fitting.

The prior art end fitting which has been described above is intended to be used with one hose only and it is not possible to use the fitting with hoses having different wall thicknesses. The fitting is assembled to the hose end by first pushing or screwing the hose into the swage body 17 and then forcing the stem member 10 into the bore of the hose. Thereafter, the swage body 17 is swaged radially inwardly from the condition shown in Figure 1 to that shown in Figure 2.

During this swaging operation the whole swage body 17 is initially moved inwardly, such that the barbs 21 penetrate the outer covering of the hose 11 and, at the same time, in the absence of any resistance, the nose portion 18 moves into the groove 16. Thereafter, continued swaging of the body 17 causes the barbs 21 to penetrate further into the hose wall and the hose wall is compressed between the two fitting components.

A point to be noted in relation to the arrangement shown in Figures 1 and 2 is that, if the swage body 17 were to be swaged to an extent beyond that shown in Figure 2, to effect clamping of a hose having a thinner wall, the nose end of the swage body 17 would have nowhere to go but radially inwardly. This would result in a deforming force being transmitted to the stem member, and the bore 12 of the stem member would be deformed inwardly to cause a reduction in the diameter of the fitting. Thus, the prior art swage bodies are not suitable for use with hoses having different wall thicknesses.

The end fitting which embodies the present invention and which is illustrated in Figures 3 and 4 is superficially similar to the above described prior art fitting, but there are important differences which will be described later in this specification.

The fitting shown in Figures 3 and 4 comprises a stem member 30 and a swage body 31. The stem member 30 has a through bore 32, a tail or stem portion 33 which is formed along a major portion of its length with external barbs 34, a shoulder 35 ahead of the stem portion 33, a circumferential groove 36 and, at the forward end of the stem member, a coupling nut 37. The swage body 31 has three notionally separate portions, a nose portion 38 having an inwardly directed flange 39, a diametrically larger hose clamping portion 40 which incorporates a series of inwardly directed barbs 41, and an inwardly directed nib 42, and an inclined intermediate portion 43 which joins the nose portion 38 to the hose clamping portion 40.

Two important features distinquish between the end fitting which is ilustrated in Figures 1 and 2 and that which is shown in Figures 3 and 4. Firstly, the swage body of Figure 4 includes a circumferential land 44 which surrounds the nose portion. Secondly, the inwardly directed flange 39 in the nose portion of the swage body has a longitudinal length which is less that the width of the complementary groove 36 in the stem member. This second feature is best seen from Figure 5 and 6 of the drawings.

When assembling the end fitting of Figures 3 and 4 to a hose 45, which has a thick wall, the hose end is first pushed or screwed into the swage body 31 and the stem member 30 is then pushed into the bore of the hose. Thereafter, the end fitting is located within a swaging press (a portion of which is shown in Figures 5 to 7 and identified by numeral 46) and the swage body 31 is swaged inwardly to the condition shown in Figure 5. At this stage the flange 39 is located within the groove 36, the barbs 41 have penetrated the outer casing of the hose without deforming the reinforcement, and the swaging press is bearing on the land 44 at the nose end of the swage body.

As the swaging press effects a further clamping operation on the thick walled hose 46, to positively lock the hose end between the fitting components, the hose

clamping portion 40 of the swage body 31 is swaged inwardly and, at the same time, the circumferential land 44 is compressed and caused to flow into the main body of metal in the nose end of the swage body. This condition is shown in Figure 6 of the drawings and it represents the final clamp position of the fitting components when clamping the thick-walled hose 45.

If the swage body 31 is required to clamp onto a thin-walled hose 47, as shown in Figure 7, the swage body 31 must be swaged inwardly to a further extent from that shown in Figure 6. This further inward movement must be effected without causing the stem portion 30 to collapse under the swage body, and it is for this reason that the groove 36 has a width greater than the longitudinal length of the inwardly directed flange 39.

Thus, as the swage body 31 is subjected to final movement, so as to positively clamp the thin-walled hose 47, the hose clamping portion 40 of the swage body is moved inwardly and, at the same time, the metal within the nose portion 38 of the swage body is caused to flow such that the inwardly directed flange 39 occupies the full width of the groove 36. This condition is shown in Figure 7 of the drawings.

As an alternative to making the width of the groove 36 greater than the longitudinal length of the flange 39, the nose portion 38 of the swage body may be formed with grooves or recesses, indicated by numerals 48 to 51 in Figures 8B, C, D, and E. Such grooves or recesses provide voids which accommodate compression of the nose portion of the swage body and/or provide voids to accommodate the flow of metal within the nose portion during compression of the swage body.

Other variations and modifications may be made in respect of the end fitting as above described without departing from the scope of the following claims.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A hose end fitting comprising a metal stem member which is intended to locate within the bore of a hose and a metal swage body which is intended to locate coaxially about the hose wall and to clamp the hose end onto the stem member under the influence of a swaging force; the swage body having an inwardly projecting circumferential flange forming a part of a nose portion at one end of the swage body, and the stem member being formed with a groove for receiving the flange when the swage body is swaged onto the hose end, the swage body being provided with a circumferential land which is formed about the nose portion, and the stem member and/or the swage body being formed with a region which accommodates the displacement of metal in the nose portion after the flange has been located within the groove by the application of an initial swaging force and a further swaging force is applied.

2. The hose end fitting as claimed in claim 1 wherein the groove in the stem member has a width which is greater than the longitudinal length of the swage body flange, the excess space within the groove constituting the region that accommodates metal displacement within the swage body during swaging of the swage body.

3. The hose end fitting as claimed in claim 1 wherein the nose portion of the swage body is formed with at least one groove or recess, the groove or recess constituting the region that accommodates metal displacement within the swage body during swaging of the swage body.

4. The hose end fitting as claimed in any one of claims 1 to 3 wherein the swage body has three notionally distinct longitudinal regions, a first region

containing the nose portion, a second region which is constituted by a diametrically larger hose clamping portion which contains a series of inwardly directed barbs, and the third region comprising an inclined intermediate portion which joins the first and second regions.

5. The hose end fitting substantially as hereinbefore described with reference to Figures 3 to 8 of the accompanying drawings.

DATED this 30th day of March 1988

FREDERICK DUFFIELD PTY. LIMITED
by its Patent Attorney

K. J. Waldron

of GRIFFITH HASSEL & FRAZER

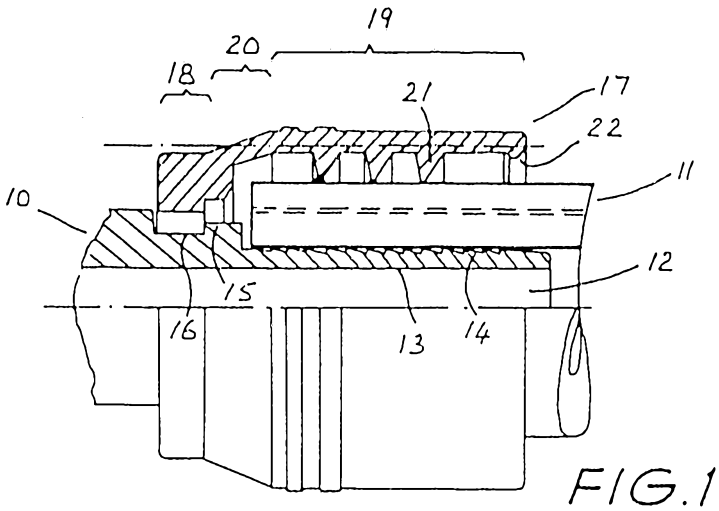

FIG.1

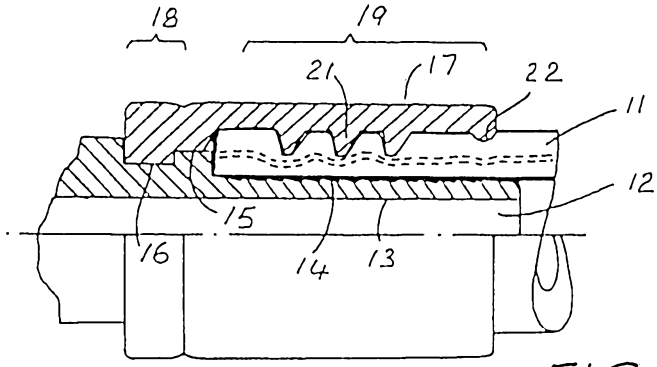

FIG.2

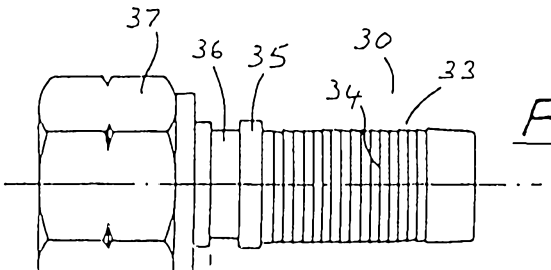

FIG.3

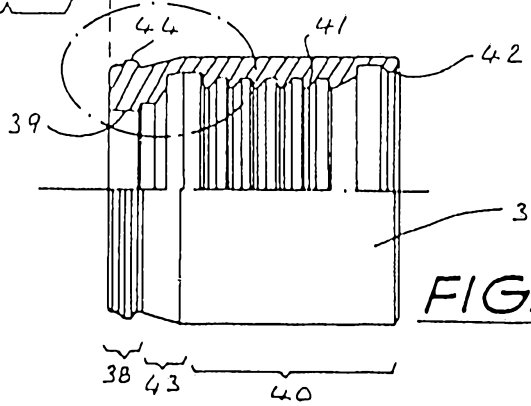

FIG.4

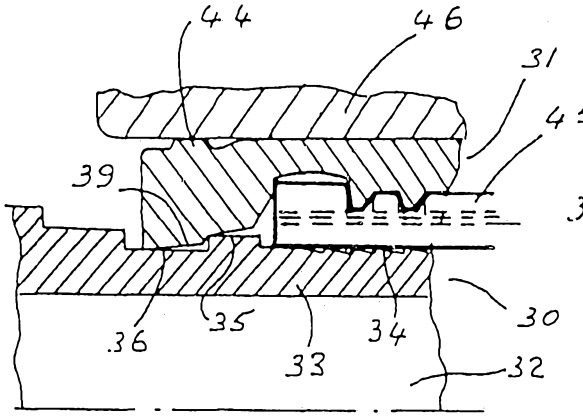

FIG. 5

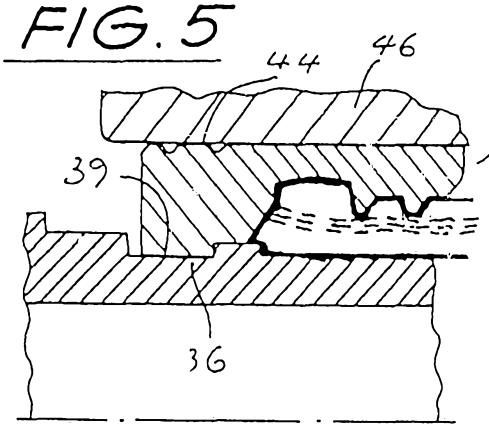

FIG. 6

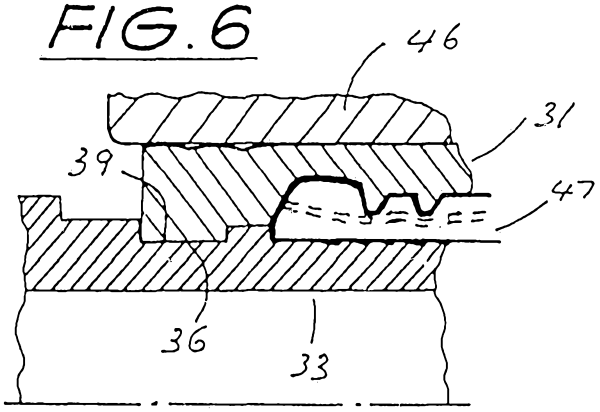

FIG. 7

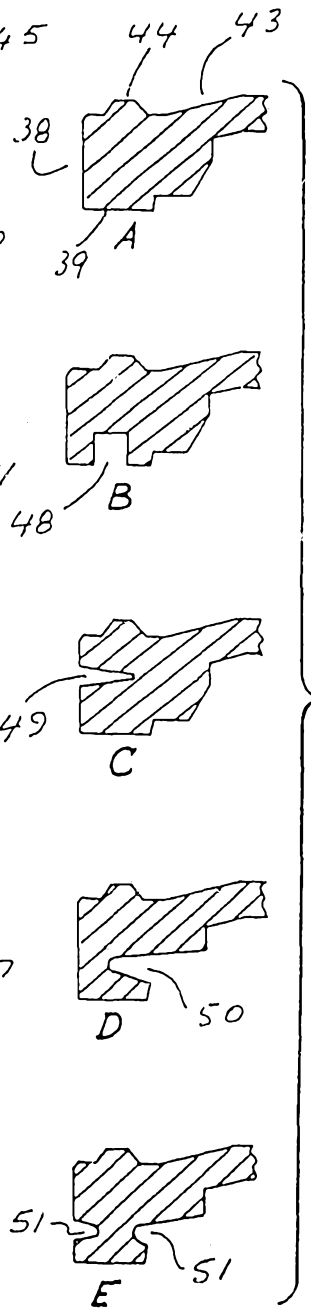

FIG. 8