

PATENT SPECIFICATION

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(19)



(54) FLEXIBLE DUCTING JOINT

(71) We COAL INDUSTRY (PATENTS) LIMITED, a company organised in accordance with the laws of Great Britain of Hobart House, Grosvenor Place, London, S.W.1. England do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to flexible ducting to joints for such ducting and to a method of making these joints.

Flexible ducting is used in many mines for ventilation purposes and usually comprises a cloth tube which is supplied in lengths and joined between the lengths. Air is blown or drawn through the ducting to the required positions. In order for the ventilation to be efficient it is necessary that the ducting is substantially leakproof and that the joints are effective. The ducting itself is made from a fabric material such as nylon or terylene which is coated with a plastic material such as p.v.c. In certain cases the coating may also include anti-static materials.

One form of jointing which has been used is that of two interlocking rings. At the end of each length of ducting the cuff has a flexible ring stitched in it. To make the joint the ring at the end of one length of ducting is bent so as to pass through an identical ring attached to an adjacent length of ducting. The first ring is then pulled back until it abuts behind the ring on the adjacent length. This type of joint is cheap but has the serious disadvantage of not being a sufficiently positive joint for all uses as it can, on occasions, separate under pressure or strain. Furthermore, there is a grave risk that when the pressure within the ducting falls and the ducting collapses the joints may come apart if one ring falls back inside the ducting since it

may pull out of the ducting when ventilation is re-started.

An alternative form of joint is one which uses a draw-string or the like to pull one end of the ducting tight round an adjacent end which is inserted into the first end. These alternative forms suffer from the disadvantages that since there are many pieces which are not integral parts of the ducting they may become damaged or lost. Furthermore, the drawstrings have been known to break and if the strings are pulled too tight they throttle the joint to reduce the size of the ducting at the joint. Furthermore if the string is not secured sufficiently tightly or stretches the joint will be subject to a high leakage rate.

It is an object of the present invention to provide a joint which substantially overcomes these disadvantages.

According to a first aspect of the present invention a length of flexible ducting has a substantially parallel pair of rings secured to it at one of its ends, the first of said rings is of a smaller diameter than the second ring and is attached at the extreme end of the ducting and the second of said rings is attached at a predetermined distance from said extreme end, the said predetermined distance being such as to retain between the rings an elastically deformable ring attached to an end of a second length of flexible ducting, which ring is arranged in use, to be deformed and, passed into the first ducting to be retained between the said two rings to form a joint between the lengths of ducting.

The ducting will normally be of a circular cross section and the rings will be of a corresponding shape. If the ducting is other than circular in cross-section and the rings have a corresponding non-circular shape the word 'diameter' as used herein is to be construed as relating to the dimensions of that shape.

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The rings may be secured to the ducting by stitching or bonding or may be secured in pockets attached to the ducting. One or both rings may be made from a material such as plastics or wire rope which when formed into a ring enables the ring to be elastically deformable.

Preferably the ducting is provided with the pair of rings at one of end of a length and a single elastically deformable ring at the other end. However, pairs of rings may be provided at both ends if necessary.

According to a second aspect of the invention a flexible ducting joint includes a first length of flexible ducting having a pair of rings at its end as above described and a second length of flexible ducting having an elastically deformable ring secured to its end, the said end of the second length of flexible ducting being inserted into the one end of the said first length and being positioned substantially parallel to and between the pair of rings.

The invention also includes, according to a third aspect, a method of connection a first length of flexible ducting with a second length to make a joint as described above by deforming the elastically deformable ring attached to the second length of ducting, passing it into the end of the first length of ducting, positioning it between the two rings of the said first length of ducting and then releasing it to allow it to revert to its natural shape.

In order that the invention may be readily understood one embodiment of a joint of a flexible ducting in accordance with the invention and using the method thereof will now be described by way of example only with reference to the accompanying drawings. In the drawings Fig. 1 shows a perspective view of the joint, Fig. 2 shows the two ends of adjacent lengths of ducting prior to ducting, Fig. 3 shows the ends of Fig. 2 during jointing, Fig. 4 shows the completed joint and Fig. 5 shows how the joint is disconnected. Figures 2-5 are all side views.

Referring to the drawings two lengths of flexible ducting 1,2 made of p.v.c. coated nylon fabric each have rings secured to their ends. The ducting 1 has an elastically deformable ring 3 of wire rope stitched to its cuff. The ducting 2 has a ring 4 stitched to the end of its cuff and a ring 5 stitched a short distance along the length of the ducting 28. The ring 5 is parallel to the ring 4. Both rings 4 and 5 are also made from steel rope. The rings 3 and 5 are of the same diameter whereas the ring 4 is of a slightly smaller diameter. The stitching on the ducting 2 which holds the rings 4 and 5 in position is arranged so that the rings present abutments on their facing sides.

Referring now particularly to Fig. 3 the

ring 3 of the ducting 1 is squeezed and passed into the ducting 2. Part of the ring 3 is positioned as shown between the rings 4 and 5 and the rest of the ring is then brought back so that the whole of the ring 3 is positioned between rings 4 and 5. The deforming pressure on ring 3 is released and the ring takes up a position as shown in Fig. 4 to complete the joint.

If the joint is to be disconnected this can be done easily by deforming the ring 3 and pulling the end of the ducting 1 out of the ducting 2 as shown in Fig. 5.

When air is blown through the ducting the joint is in tension and the ring 3 is held against the ring 4 to make a tight joint. Since the ring 4 is of a slightly smaller diameter than the ring 3 there is no risk at all of the joint springing. When the air pressure within the ducting falls, the joint does not collapse since the ring 3 is prevented by the ring 5 from falling into the ducting 2 and by the ring 4 from falling away from it.

The rings are simple to incorporate into the ducting ends and are themselves cheap in manufacture. There are no separate pieces which can get lost and it is unlikely that the parts will be easily damaged. Even if the rings are damaged to some extent, they may still operate successfully. The degree of air leakage is much less than in prior art types of joint.

In one typical construction of joint the rings 3 and 5 were 20" in diameter and the ring 4 was 19" in diameter. Rings 4 and 5 were spaced along the ducting 2 by a distance of 4". The rings themselves were comprised of stranded wire of a total nominal thickness of $\frac{1}{2}$ ". In an alternative joint the rings 3 and 5 were 30" in diameter and the ring 4 was 28 $\frac{1}{2}$ " diameter. The spacing between rings 4 and 5 was 4" and the diameter of the rings was $\frac{1}{2}$ ".

The joint was able to operate extremely satisfactorily at normal mine ventilation pressures of 10-12 inches water gauge and was able to accept higher pressures of the order of 25 inches water gauge without any noticeable increase in air leakage.

It should be appreciated that the normal construction of a length of ducting will be such that one end of the ducting has a single ring 3 and the other end has a double ring 4,5. However, there is no reason why one length of ducting may be provided at both ends with single rings 3 and the next length of ducting with double rings 4,5 at each end.

The rings may be secured to the ducting by other means such as bonding with adhesives or welding if the material of the ducting is of a suitable material such as one with a high plastics content. Alternatively the rings can be placed in pockets on the ducting.

WHAT WE CLAIM IS:

1. A length of flexible ducting having a substantially parallel pair of rings secured to it at one of its ends, the first of said rings being of a smaller diameter than the second ring and being attached at the extreme end of the ducting and the second of said rings being attached at a predetermined distance from said extreme end, the said predetermined distance being such as to be sufficient to retain between the rings an elastically deformable ring attached to an end of a second length of flexible ducting which ring is arranged in use to be deformed and passed into the first ducting to be retained between the said two rings to form a joint between the lengths of ducting.
2. A length of flexible ducting as claimed in Claim 1 wherein the first and second rings are secured to the ducting by stitching them to the ducting.
3. A length of flexible ducting as claimed in Claim 1, in which the rings are secured to the ducting by bonding to the ducting.
4. A length of flexible ducting as claimed in Claim 2 or Claim 3 in which at least one of the rings is enclosed in a pocket secured to the ducting by stitching or bonding.
5. A length of flexible ducting as claimed in any preceding claim, wherein the pair of rings are constructed from a material which when formed into a ring enables the ring to be elastically deformable.
6. A length of flexible ducting as claimed in Claim 5, wherein the material is a plastics material or a wire rope.
7. A length of flexible ducting as claimed in any preceding claim, wherein both ends

of the ducting are provided with a substantially parallel pair of rings.

8. A length of flexible ducting as claimed in any one of Claims 1 to 6, wherein the other end of the ducting has an elastically deformable ring secured to it.

9. A flexible ducting joint including a first length of flexible ducting as claimed in any preceding claim and a second length of flexible ducting having an elastically deformable ring secured to its end, the said end of the second length of flexible ducting being inserted into the one end of the said first length and being positioned substantially parallel to and between the said pair of rings.

10. A method of connecting together the ends of a first length of flexible ducting with a second length of flexible ducting to form a joint as claimed in Claim 9, wherein the elastically deformable ring attached to the second length of ducting is deformed and passed into the end of the first length of ducting, positioned between the two rings of the said first length of ducting and then released to allow it to revert to its natural shape.

11. A length of flexible ducting substantially as hereinbefore described with reference to the accompanying drawings.

12. A flexible ducting joint substantially as hereinbefore described with reference to the accompanying drawings.

13. A method of making a flexible ducting joint substantially as hereinbefore described with reference to the accompanying drawings.

For the Applicants,
J. I. WOOD,
Chartered Patent Agent.

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2. A length of flexible ducting as claimed in Claim 1 wherein the first and second rings are secured to the ducting by stitching them to the ducting.
3. A length of flexible ducting as claimed in Claim 1, in which the rings are secured to the ducting by bonding to the ducting.
4. A length of flexible ducting as claimed in Claim 2 or Claim 3 in which at least one of the rings is enclosed in a pocket secured to the ducting by stitching or bonding.
5. A length of flexible ducting as claimed in any preceding claim, wherein the pair of rings are constructed from a material which when formed into a ring enables the ring to be elastically deformable.
6. A length of flexible ducting as claimed in Claim 5, wherein the material is a plastics material or a wire rope.
7. A length of flexible ducting as claimed in any preceding claim, wherein both ends

of the ducting are provided with a substantially parallel pair of rings.

8. A length of flexible ducting as claimed in any one of Claims 1 to 6, wherein the other end of the ducting has an elastically deformable ring secured to it.

9. A flexible ducting joint including a first length of flexible ducting as claimed in any preceding claim and a second length of flexible ducting having an elastically deformable ring secured to its end, the said end of the second length of flexible ducting being inserted into the one end of the said first length and being positioned substantially parallel to and between the said pair of rings.

10. A method of connecting together the ends of a first length of flexible ducting with a second length of flexible ducting to form a joint as claimed in Claim 9, wherein the elastically deformable ring attached to the second length of ducting is deformed and passed into the end of the first length of ducting, positioned between the two rings of the said first length of ducting and then released to allow it to revert to its natural shape.

11. A length of flexible ducting substantially as hereinbefore described with reference to the accompanying drawings.

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