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TUBULAR SHEATHS FOR BOWDEN CABLE DEVICES AND THE LIKE
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Serial No.
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Fig. 1

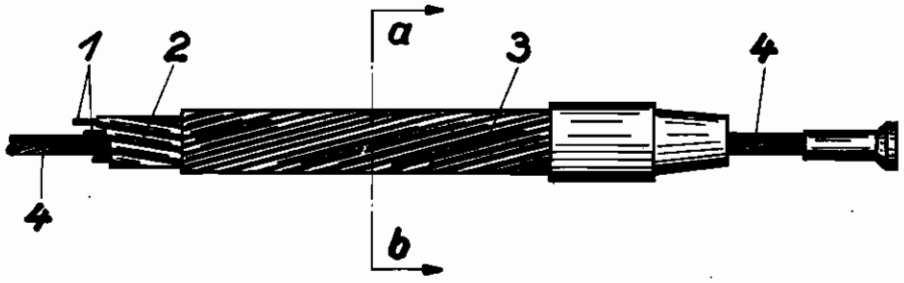
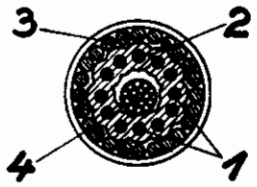


Fig. 2



Schnitt a-b

Fig. 3

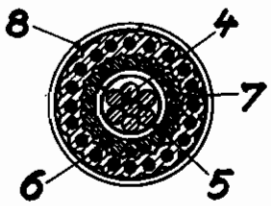
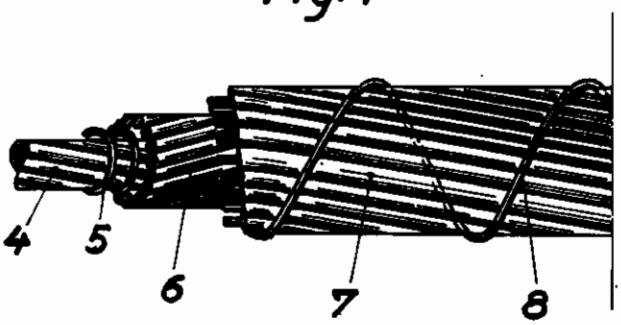


Fig. 4



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ALIEN PROPERTY CUSTODIAN

TUBULAR SHEATHS FOR BOWDEN CABLE DEVICES AND THE LIKE

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In flexible sheaths for brakes or Bowden cable devices having a guiding sheath formed of laid wires it is necessary to prevent dust and moisture or water penetrating from the outside between the wires into the interior and the lubricant escaping from the inside, in order that the freedom of movement of the pull element shall not suffer. For this purpose it has already been proposed to lay hemp threads between the wires. According to another proposal these laid wire sheaths are surrounded by a rubber hose, but this construction is thick and heavy and, when the slipped-over hose becomes damaged, any moisture which may have penetrated will affect the arrangement throughout its entire length.

The present invention relates to a flexible tube for brakes, which consists of laid wires or braided bands and which is rendered impervious in the following manner. The wires or bands are each coated with an organic oil- and water-resisting substance (condensation products, artificial resin or polymerisates of acryl acid, polyvinyl, polyvinyl chloride, polystyrol, with or without the admixture of softeners or fillers) and this coating is prepared shortly before the laying of these wires in the laying machine by heating or the application of adhesives or solvents, so that, during the laying operation, the wire coatings become firmly and intimately united in the tube at the places of contact and the coatings form a compact closed sheath. The heating may be effected electrically or, in view of the temperatures required, in casings which are heated with steam. When vulcanisable substances (bitumen, artificial rubber, buna) are used, each wire may, before being wound at the laying reel, be covered on the wrapping and shearing machine with unvulcanised rubber and the laid or wrapped wire hose (consisting of wires or bands coated with organic substance) may then be drawn in the laying place or shortly afterwards through a vulcanising device which is disposed in the laying place or behind the latter. For mechanically protecting this sheath of oil-resisting a water-tight substance a second layer of wires or any other mechanically strong sheath of metal or other material may be used. The intimate connecting of the places of contact of the wire coatings of organic substance can, even in the case of unvulcanisable substances, be effected after the laying of the coated wires, if the kind of artificial material used permits of this (polymerisation). The above-described manner of forming a close impervious sheath has the advantage, that, in uniting the wires surrounded with individual coverings to form a closed common sheath, it is only necessary to act on the outer part of the individual coverings, in such a manner that the inner parts of the individual coverings will adhere firmly to the wires and will retain their original wall thickness. The finished impervious covering of the wires formed in this way may therefore be very thin and has this advantage over a slipped-on hose, that the impervious covering means is also between each two adjacent wires, so that, in contradistinction to the construction with an externally slipped-on rubber hose, even any wearing away of the outer layer of the organic substance will not detrimentally affect the impervious covering against the penetration of moisture. On the other hand the thickness of layer can be made very small as compared with the externally slipped-on hose or surrounding covering. As the organic substance is in the main only between each two adjacent wires, the total consumption of material is very small compared with other methods.

The figures show by way of example constructional forms of a flexible sheath for a brake, rendered impervious in this way. In Figs. 1 and 2 *a* indicates the wires which are first individually coated with a covering of organic substance *b* and which by melting or adhesion (vulcanisation or polymerisation) of this substance are intimately connected with one another to form an impervious sheath; *c* are the wires of an outer sheath which may be laid around the inner sheath, *d* is pull element of the flexible brake sheath or of the Bowden cable device, which is disposed so as to be capable of moving in the interior of the watertight sheath. This watertight and oiltight wire sheath provides greater flexibility and reliability than a hoselike superficial covering, in spite of less wall thickness and less consumption of material, as the effective thickness corresponds to the thickness of the wires. When two sheaths of laid wires are used, both of them or only the outer one may be made of coated wires as an impervious sheath.

In the interior of the sheath a helical expanding protective spiral of wire can be provided, which is not covered with organic substance, so as not to increase the friction of the pull element. Figs. 3 and 4 show a construction with an inner metal helix *e* made of round or profiled wires; *f* is the inner laid layer consisting for instance of bare wires. The closed watertight and oil resisting sheath bears the reference *g*. Preferably, the laid layers are laid in opposite directions.

h is the outer helical wire winding in the form of an open helix. The pull element again bears the reference *d*. The illustration given by way of example only shows the essential features of the invention. The idea underlying the invention as above described, may of course be applied to all such constructions of flexible sheaths for brakes, however the individual parts are formed or arranged with respect to one another. In place of coated round wires, profiled wires may also be used, for instance Z-shaped wires like those used in cables with closed armouring or wires of flat cross section, which interengage with tongue and groove.

The impervious sheath, instead of being made from laid coated wires, may also be made of braided or wrapped coated round or flat wires or bands (or a wrapping formed of flat strip). The procedure may be such that wires already provided with a coating are paid out by the reel of the laying machine and are so prepared before the laying point by heating, dissolving or rendering sticky the organic substance that they unite firmly with one another during the laying of the wires in the tube or are united with one another in a device disposed behind the latter under the application of pressure and/or heat. Instead of ready coated wires being supplied to the reels of the laying machine, wires without a coating may be used, which are then given individually just before or in the laying tube a coating of organic substance. The consolidation, adhesion or vulcanisation can in this method be effected in the same way as previously described.

The sheath of laid (or wrapped on) wires (or bands) produced in the manner described above, which are coated with an organic artificial material which is resistant to oil and chemicals, is also suitable for use as a hose for the conveyance of liquids, for instance oil and as it is very resistant to tensile and compressive forces, is particularly suitable for use in cases, in which liquids or gases are to be conveyed under high pressure. The laying of the wires which are coated with organic substance and are to be united may be effected in one or two layers over a supporting helix of round, flat or profiled wire. For increasing the resistance to pressure, an additional open wire helix may be wound around the sheath so formed. In place of the iron or steel wires in the organic sheath wires of some other metal, for instance of copper, aluminium, magnesium or, in order to reduce the weight light metal alloys, such as aldrey, electron, or duralumin may be used.

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