United States Patent [19]

David

[11] **3,738,383**

[45] **June 12, 1973**

[54] **STRUCTURE WITH PROTECTIVE COVERING AGAINST AMBIENT INFLUENCES**

[75] Inventor: **Walfried David,** Maxdorf, Germany

[73] Assignee: **Bopp & Reuther GmbH,** Mannheim, Germany

[22] Filed: **Nov. 11, 1971**

[21] Appl. No.: **197,807**

[30] **Foreign Application Priority Data**

Nov. 19, 1970 Germany ..... P 20 56 860.9

[52] **U.S. Cl.** **137/381,** 285/45, 287/130

[51] **Int. Cl.** **F16k 27/06**

[58] **Field of Search** ..... 287/129, 130; 285/45, 260; 206/46 H, 16.5; 150/52 R, 52 L; 137/378, 381; 251/335

[56] **References Cited**

UNITED STATES PATENTS

3,163,450	12/1964	Eirhart	285/260 X
937,570	10/1909	Davis et al.	137/378
2,735,699	2/1956	Chadbourne	285/260 X
3,140,495	7/1964	Gottwik	285/260 X
3,396,940	8/1968	Jones	251/335 R
3,410,303	11/1968	Johnson	137/381
3,425,724	2/1969	Resener	287/130

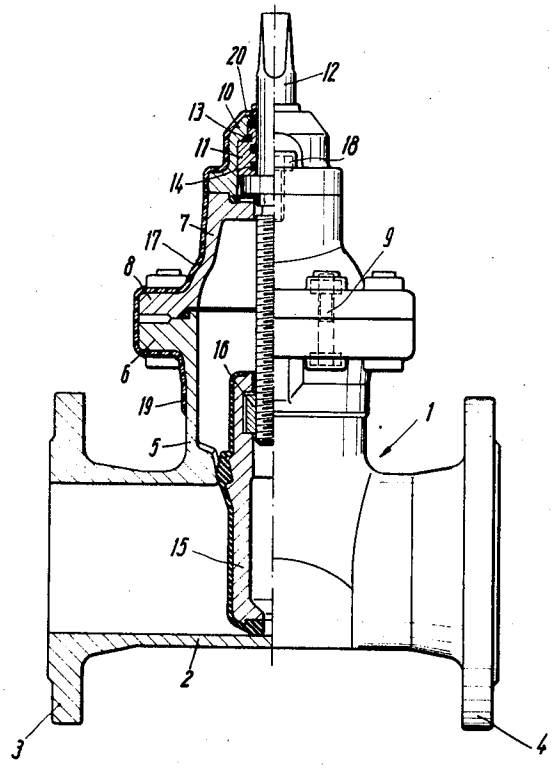
Primary Examiner—Henry T. Klinksiek

Attorney—Michael S. Striker

[57] **ABSTRACT**

A valve housing, connected pipe flanges or similar structure is surrounded by a one-piece sheath of elastically distendable material resistance to the ambient influences against which the structure is to be protected. The hollow interior of the sheath has an interior contour which corresponds to the outer contour of the structure and the sheath tightly encases the structure in surface-to-surface relationship.

9 Claims, 3 Drawing Figures



PATENTED JUN 12 1973

3,738,383

SHEET 1 OF 3

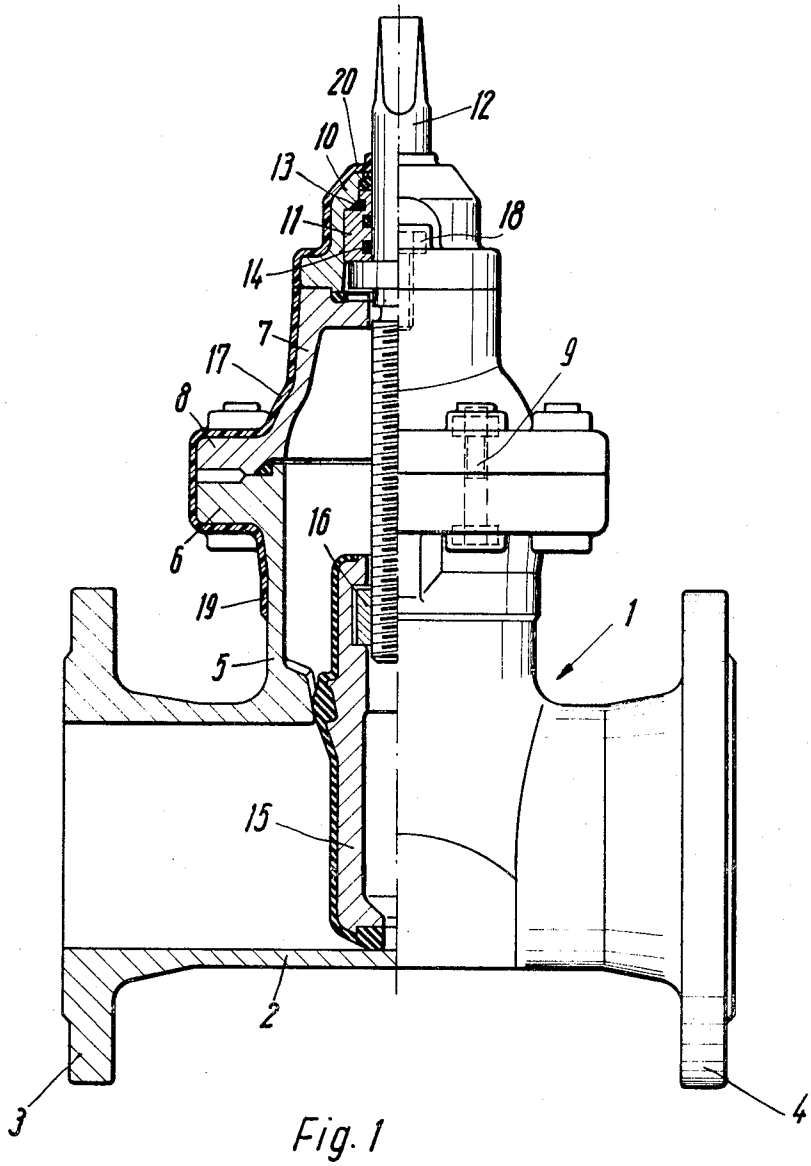


Fig. 1

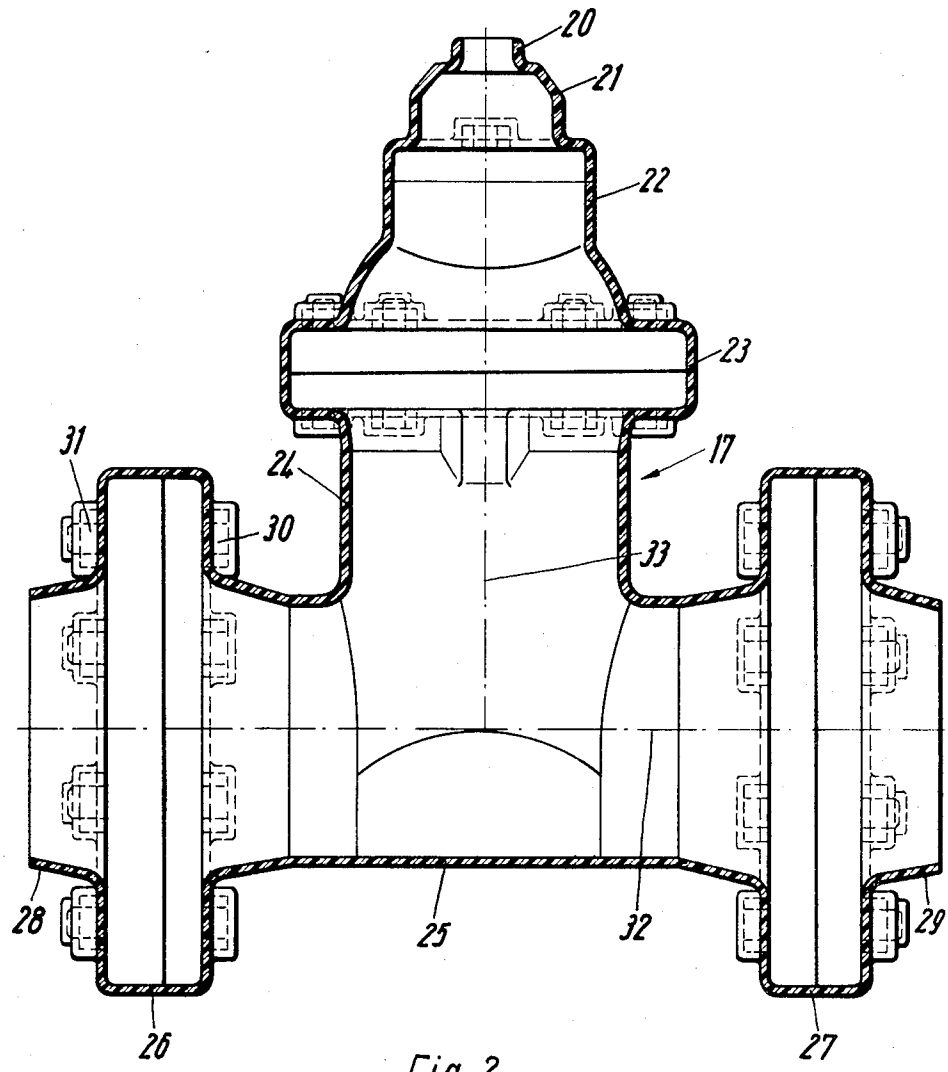


Fig. 2

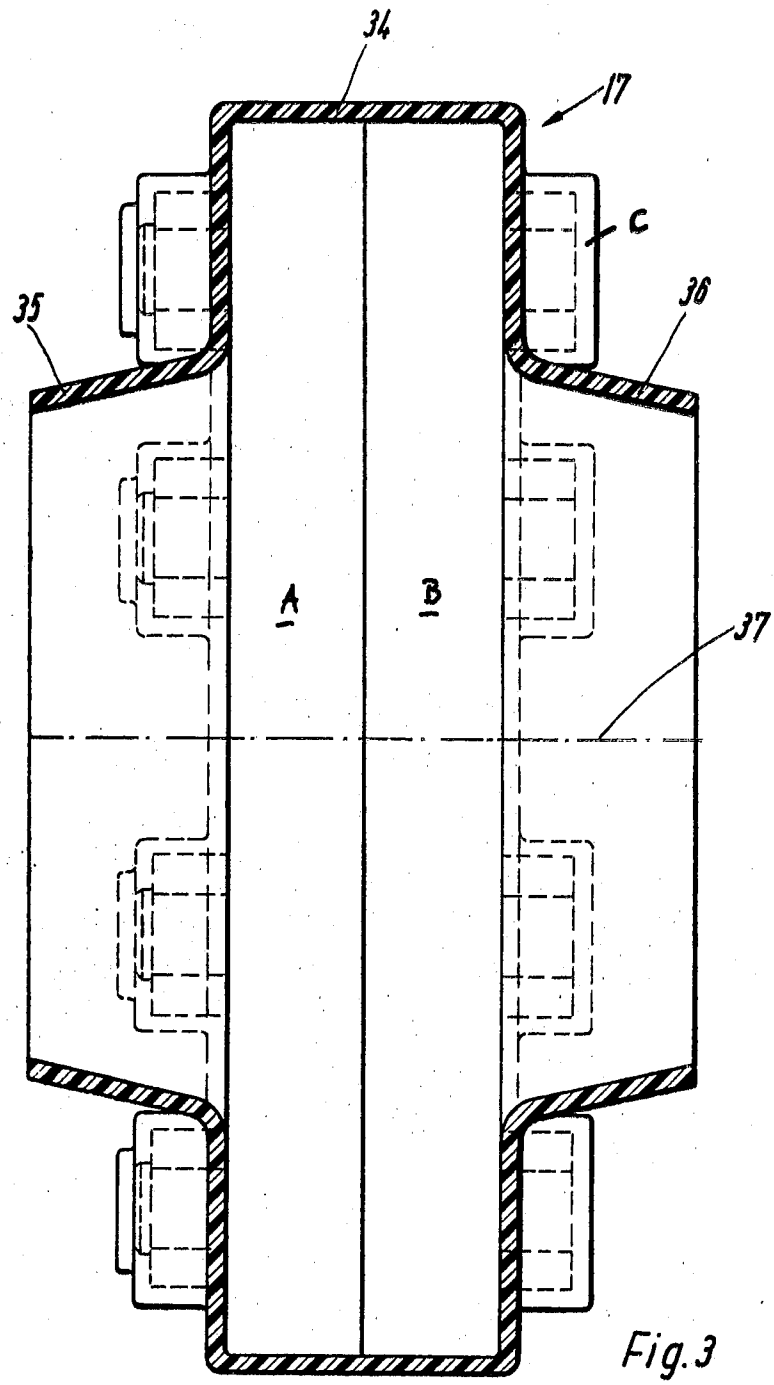


Fig. 3

STRUCTURE WITH PROTECTIVE COVERING AGAINST AMBIENT INFLUENCES

BACKGROUND OF THE INVENTION

The present invention relates generally to the protection of structures against ambient influences, and more particularly to the protection of valve housings, pipe unions, connected pipe flanges or the like against such ambient influences.

If pipes are to be laid on ground or below ground, and are provided with valves, it is already known to coat the valve components—particularly the housing—with a coating of protective lacquer or the like in order to prevent the corrosion of such components. However, it is well known that such a protective coating can and frequently is removed in part during installation, as a result of impacts which cause it to flake or break off locally, so that a complete and reliable corrosion protection is not assured. In particular the outermost flange connecting screws or bolts are endangered by corrosion in such constructions, it being evidently economically impractical to make such components of rust-free steel to avoid this difficulty.

An additional problem in this area occurs if such valves are to be located on or below ground in the proximity of high-voltage cables, because in such case it is necessary to provide additionally an adequate cathodic protection. Heretofore, it has been attempted to provide this in that after assembly of the exterior components of the valve in the factory these components were provided with a layer of hardenable material, for instance a bituminous layer of several millimeters thickness. Here, again, however, it was found that during loading and transporting of thus-protected valves it is almost impossible to avoid that portions of the protective layer flake off or break off as a result of impacts or the like so that again neither adequate cathodic protection nor sufficient corrosion protection is assured. Also, the protective layer in such instances was usually applied manually, an undertaking which is both time-consuming and inexpensive, and which does not assure uniformity in the thickness of the protective layer.

SUMMARY OF THE INVENTION

It is, accordingly, a general object of the present invention to provide an improved arrangement of the type here under discussion which is not possessed of these disadvantages of the prior art.

More particularly it is an object of the present invention to provide such an improved arrangement which is afforded the desired protection against ambient influences, particularly a reliable cathodic protection and a reliable corrosion protection.

In pursuance of these and other objects which will become apparent hereafter, one feature of the invention resides in the provision of an arrangement of the character described which, briefly stated, comprises a structure which is to be protected against ambient influences and which has at least in part a given outer contour, and a discrete one-piece sheath of elastically distendable material resistant to such ambient influences. The sheath has a hollow interior whose inner contour corresponds to the outer contour and tightly encases the structure in surface-to-surface relationship therewith.

The sheath is not only of one piece but is separate from the structure itself, being produced independently, and is pulled onto the structure or the part thereof which is to be protected, under simultaneous distending of the material of the sheath. In this manner a reliable and complete protection of the structure or part thereof is assured, and moreover can be provided by applying the protective sheath in situ, that is at the time and place of use rather than in the factory. This avoids the possibility of damage to the sheath during loading and transporting.

The tight surface-to-surface engagement of the sheath with the structure or part to be protected is assured in that the dimensions of the hollow interior, whose inner contour otherwise corresponds to the outer contour of the structure or part thereof to be protected, are somewhat smaller than the structure or part thereof so that the material of the sheath is elastically distended when it is placed onto the structure and will thus engage the surrounded and encased parts thereof in tight surface-to-surface contact under pre-tension. Such tight engagement is particularly advantageous where the sheath engages connecting screws or bolts of flanges or the like.

The sheath according to the present invention can be produced in very simple manner, by resorting to mass-production techniques, being made of a suitable synthetic plastic material by dipping, injection-molding or by press-molding. It can be applied in situ without any tools or other aids and with a minimum loss of time.

If the structure which is to be protected is a valve, in particular of the gate-valve type, and has a tubular portion provided at opposite axial ends with connecting flanges for connection to pipe sections, and a housing which extends transversely to the axis of the tubular portion and to which a hood-part is connected by means of additional flanges, then it is advantageous according to a further concept of the invention to provide the sheath at one lateral side with a slot which extends longitudinally of the tubular portion and another slot which extends normal to the first slot in order to facilitate placing of the sheath about the valve whereupon the slots are closed by welding, vulcanizing, bonding or the like in order to make them fluid-tight.

By locating such slot or slots at one lateral side of the sheath, the latter can be placed in a very simple and time-saving manner not only about the housing of the valve itself, but also about the tubular portion which, as already indicated above, usually extends at a right angle to the housing itself. Furthermore, even with this construction the utilization of the two aforementioned slots makes it possible still to employ a one-piece sheath. It is simply necessary to distend the material of the sheath at the two slots which cross and intersect one another, and to apply the sheath onto the valve and subsequently to close the slots or slits whereupon the valve is completely encased and protected.

It is advantageous to provide the sheath with portions—of one piece with the remainder of the sheath—which also surround not only the connecting flanges of the valve itself, but also those flanges of the pipe sections which are respectively connected with these connecting flanges.

With such a construction the entire valve and associated portions of the pipe sections which are connected with it, namely the flanges of these pipe sections, can be encased and protected against ambient influences (such as corrosion, etc.) in a single operation and in toto, substantially simplifying the application of the

protection and omitting the possibility that portions might remain unconnected where damage could occur. The pipe sections themselves are usually separately protected for cathodic protecting purposes in conventional well-known manner.

In so far as parts of the structure to be protected extend outwardly through openings provided for this purpose in the sheath, it is also advantageous to bond annular portions of the sheath which bound such openings to corresponding surface portions of the structure, in order to provide an absolutely tight seal at these openings to prevent the intrusion of moisture or the like.

The novel features which are considered as characteristic of the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a partially sectioned side-elevational view of a valve structure provided with a sheath according to the present invention;

FIG. 2 is a view analogous to FIG. 2 but showing a different embodiment; and

FIG. 3 is a somewhat diagrammatic, partially sectioned view illustrating still another embodiment of the invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Discussing firstly the embodiment illustrated in FIG. 1, it will be seen that reference numeral 1 identifies a valve in toto. This valve is of the gate-valve type having an elongated tubular portion 2 which is provided at its opposite axial ends with connecting flanges 3 and 4. Extending transversely of the axial elongation of the tubular portion 2 is a housing portion 5 provided with a flange 6 to which there is secured by means of an additional flange 8 a hood 7. The flanges 6 and 8 are connected with one another by means of screws or bolts 9 and at its upper end the hood 2 is further provided with a head portion 10 which is secured with the hood 7 by means of exteriorly exposed screws or bolts 18. The head portion 10 mounts the journal 11 in which the spindle 12 is turnably received, with seals 13 and 14 being provided to seal the interior of the housing 5, 6 and 7. A nut 16 cooperates with the spindle 12 and is mounted in the valve member or gate 15 which, when the spindle 12 is turned in requisite sense, moves upwardly or downwardly in FIG. 1 in order to either extend across the cross-section of the tubular portion 2 as illustrated, thereby preventing fluid flow therethrough, or to be partly or completely retracted from this cross-section in conventional manner.

In accordance with the present invention there is provided a discrete one-piece sheath 17 for corrosion protecting purposes, which is a separate element entirely independently produced in so far as the valve 1 is concerned and composed of an elastically distendable synthetic plastic material. In the separate condition of the sheath 17, that is when the latter is not applied to the valve, the interior of the sheath 17 has a contour corresponding to the exterior contour of the valve 1, or rather in this embodiment of the portions 5, 6, 8, 7 and 10. When the sheath 17 is applied to the valve 1, it surrounds and encases the same downwardly to the housing 5 in tight surface-to-surface engagement. It thus protects the connecting screws or bolts 9 which connect the flanges 6 and 8 with one another, as well as the screws or bolts 18 and the portions 10, 7 and parts of the portion 5.

In order to provide adequate and reliable protection, and to assure that the sheath 17 has a certain strength and shape-retentive capability, the wall thickness of the sheath 1 should be adequate for such purposes, and may be on the order of one millimeter or more. No attempt has been made in the drawing to provide a correct proportional showing of the dimensions of the various components. The distending capability of the material of the sheath 17 is sufficient so that the lower marginal portion 19 bounding the lower opening in the sheath 17 can be sufficiently distended outwardly to be pulled over the flanges 8 and 6. If the dimensions are such that sufficient distending is not possible, then the sheath 17 may be provided at one lateral side with a slit extending in the direction of elongation of the spindle 17, thus permitting its ready application about the parts of the valve 1 which are to be protected as shown in FIG. 1. The edges bounding the slit are then subsequently fluid-tightly connected with one another by heat-welding, bonding, vulcanizing or the like.

In either case, and in order to assure that no moisture can enter either at the marginal annular portion 19 or at the marginal annular portion 20 of the opposite opening of the sheath 17, the marginal portions 19 and 20 are bounded by use of suitable adhesives or the like to the corresponding surface portions of the housing 5 and of the head portion 10, respectively. Advantageously, the aforementioned corresponding surface portions of the housing 5 and of the head portion 10 may be coated with a suitable adhesive before the sheath 17 is applied.

FIG. 2 shows a further embodiment of the invention in which like reference numerals designate like components as in FIG. 1. In FIG. 2, however, the sheath 17 covers not only the parts of the valve which are shown in FIG. 1, but in fact covers the entire valve and also the flanges of the associated pipe sections. Such a complete coverage and protection is required where cathodic protection is needed.

In FIG. 2 the sheath 17 has a portion 21 provided with the upper margin 20; in addition, it has a portion 22 surrounding the hood of the valve, a portion 23 surrounding the flanges connecting the hood and the housing of the valve, a portion 24 surrounding the valve housing itself, and a portion 25 surrounding the tubular portion of the valve. In addition the sheath 17 is also provided with portions 26 and 27 each of which covers one of the end flanges of the tubular portion of the valve and the flange of an associated pipe section which is associated with the respective end flange. No attempt has been made in the drawing to show these flanges other than diagrammatically, because it will be clearly understand how they will be connected, and the portions 26 and 27 also surround and encase the connectors—here shown as bolts 30 and cooperating nuts 31—which connect the respective flanges with one another as illustrated. Portions 28 and 29 extend beyond the portions 26 and 27, respectively, in order to provide a tight engagement with the respectively associ-

ated pipe sections. The entire sheath 17 is of one piece and is intended to be applied only in situ, that is only after the valve has been connected with the associated pipe sections. In order to make this possible the sheath 17 is provided at one lateral side thereof with a slit 32 which extends in axial direction of the portion 25 and with an additional slit 33 which extends normal to the slit 32. The provision of the slits 32 and 33 permits the material of the sheath 17 to be elastically distended and bent apart along these slits so that it can be placed over the valve and the flanges from one lateral side. Subsequently, the sheath 17 is released and the slits 32 and 33 are closed, after their edges are firstly tightly abutted, either by heat-welding, by vulcanizing, by bonding via a suitable bonding agent, or the like. In this manner a completely enclosed fluid-tight sheath 17 is applied onto the valve and the associated flanges of the pipe sections with which the valve is connected. The pretension of the sheath 17, required to obtain permanent surface-to-surface engagement with the structure which it protects, is obtained by drawing the slits 32 and 33 together so that the respective edges meet tightly before they are connected by welding, bonding or the like. Subsequently, marginal portions of the sheath 17 which bound the respective openings therein are again bonded to corresponding surface portions of the structure by suitable adhesives, as discussed with respect to FIG. 1.

FIG. 3, finally, shows that the invention is also applicable to protect the juncture between the connected flanges of two pipe sections. In FIG. 3 the sheath is again identified with reference numeral 17 and the flanges of the two connected pipe sections are identified with reference characters A and B, respectively. They are connected by bolt connections C as illustrated.

The sheath 17 has a portion 34 which embraces and encases the flanges A and B as well as the bolt connections C. Of one piece with the portion 34 are end portions 35 and 36 which cover annular portions of the respective pipe sections adjacent the respective flanges A and B.

The sheath 17 in the embodiment of FIG. 3 is applied by first distending either the portion 35 or 36 and placing the sheath onto one of the two pipe sections, whereupon the flanges A and B are abutted and connected by the bolt connections C. Subsequently the other portion (36 or 35) is distended and the sheath is moved into place as illustrated, with marginal portions bounding the openings and the portions 35 and 36 being bonded to the pipe sections as previously described.

If the material of the sheath 17 cannot be sufficiently distended to be applied in this manner, then one lateral side of the sheath 17 may be provided with an axially extending slit 37 which is shown in phantom lines, to permit application of the sheath 17 onto the pipe sections even after their flanges A and B have been connected. In this case it is of course necessary subsequently to close the slit 37 fluid-tightly in the manner previously discussed.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described as embodied in a valve or analogous structure provided with a protective one-piece sheath, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of the present invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is set forth in the appended claims:

1. An arrangement of the character described, comprising a valve which is to be protected against ambient influences and which has at least in part a given outer contour; and a discrete one-piece sheath of elastically distended sheet material resistant to said ambient influences, said sheath tightly encasing said valve in surface-to-surface contact therewith and having an inner contour which corresponds to said outer contour and which in distended state equals the dimensions thereof while in relaxed state it is of

smaller dimensions than those of said outer contour.

2. An arrangement as defined in claim 1, wherein said elastically distendable material is a synthetic plastic material.

3. An arrangement as defined in claim 1, said structure comprising a pair of connected and connected flanges; and wherein said sheath also encases said flanges.

4. An arrangement as defined in claim 1, said valve comprising at least two sections, and connecting means connecting said sections and exposed at the exterior of the same; and wherein said sheath encases said sections and also said connecting means.

5. An arrangement as defined in claim 1, said sheath having a plurality of openings through which portions of said valve extend to the exterior of said sheath; and further comprising means tightly connecting marginal portions of said sheath bounding the respective openings with juxtaposed surface portions of said valve.

6. An arrangement of the character described, comprising a valve which is to be protected against ambient influences, said valve having a tubular portion provided at opposite axial ends with end flanges, and a housing portion extending from said tubular portion transversely to the axis thereof; a discrete one-piece sheath of elastically distendable material resistant to said ambient influences and tightly encasing said valve in surface-to-surface contact, said sheath being provided in a lateral side with a first slit extending axially along said tubular portion for admission of the same and with a second slit normal to said first slit and extending along said housing portion for admission of the latter; and means closing said slits when said sheath encases said valve.

7. An arrangement as defined in claim 6, further comprising a pair of pipe sections each having a connecting flange connected with one of said end flanges; and wherein said sheath comprises a pair of sections each of which encases one of said end flanges and the respective connecting flange which is connected thereto.

8. A method of protecting a valve against ambient influences, comprising the steps of providing a valve having a tubular portion having opposite axial ends and a housing portion extending from said tubular portion transversely to the axis thereof; providing a one-piece sheath of elastically distendable material resistant to said influences and having a hollow interior whose inner contour corresponds to the outer contour of said valve; forming said sheath in one lateral side thereof with one slit extending in axial direction of said tubular portion and an other slit extending normal to said one slit; widening said slits by distending the material of said sheath, and thereupon placing said sheath about said valve; and fluid-tightly connecting the edges bounding the respective slits.

9. A method of protecting a structure in part against ambient influences, comprising the steps of providing a structure having a part which is to be protected against ambient influences; providing a one-piece sheath of sheet material which is elastically distendable and resistant to said ambient influences, having a hollow interior whose inner contour is dimensionally smaller than but otherwise corresponds to the outer contour of said part and which is provided with at least one opening smaller than said part and through which the latter is to be admitted into said sheath; elastically distending said opening and said sheath and placing the sheath over said part; permitting the distended sheath to relax so that it engages said part in surface-to-surface contact therewith; and fluid-tightly bonding an annular marginal portion of said sheath bounding said opening, to a corresponding surface portion of said structure.

* * * * *