

(No Model.)

R. H. MARTIN.
TUBE, PIPE, OR CONDUIT.

No. 550,281.

Patented Nov. 26, 1895.

Fig. 1.

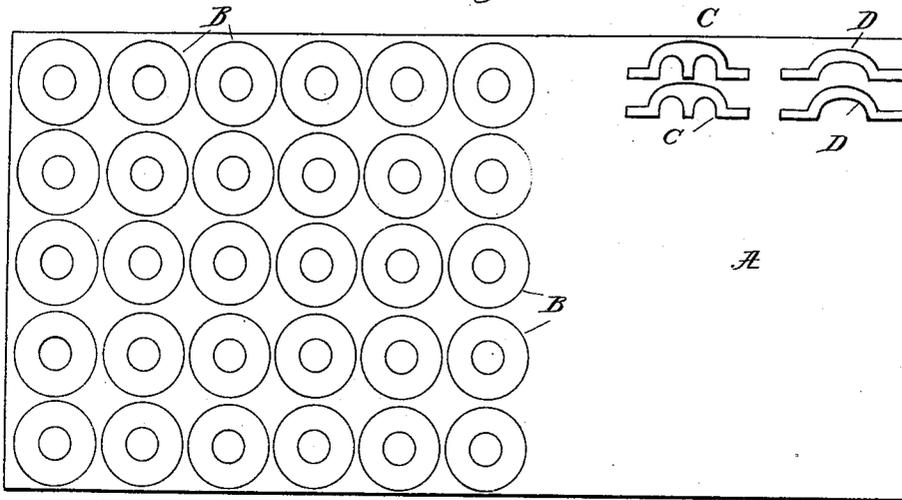


Fig. 4.

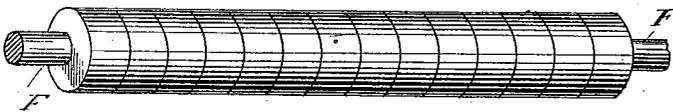


Fig. 2.

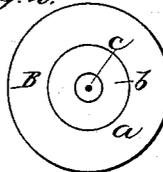


Fig. 3.

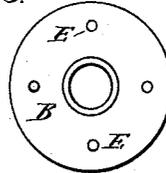


Fig. 5.

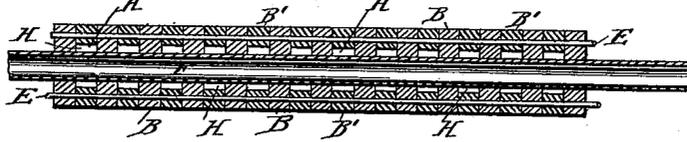
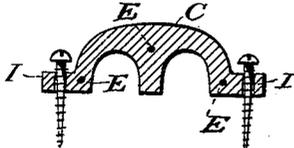


Fig. 6.



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ROBERT H. MARTIN, OF BROOKLYN, NEW YORK.

TUBE, PIPE, OR CONDUIT.

SPECIFICATION forming part of Letters Patent No. 550,281, dated November 26, 1895.

Application filed February 28, 1894. Serial No. 501,890. (No model.)

To all whom it may concern:

Be it known that I, ROBERT H. MARTIN, a citizen of the United States, and a resident of Brooklyn, in the county of Kings and State of New York, have invented a certain new and useful Improvement in Fibrous Tubes, Pipes, or Conduits, of which the following is a specification.

My invention relates to a new and improved tubular or partially tubular pipe or conduit made of fibrous materials, especially intended for non-conducting coverings and insulating purposes, although adapted as well to various other uses in the arts.

The invention, generally stated, consists in cutting from sheets of suitable fibrous material or otherwise forming a series of rings or other shaped sections of different widths, which are then fastened together side by side, thus building up a continuous tube or gutter-like structure composed of a large number of these small sections, some of which, being of less width than others, make air-spaces next the heated surface.

The invention also contemplates strengthening the structure and adding to its elasticity by the employment of wires, cords, or equivalent means, running longitudinally from section to section, whereby they, in each length of conduit, are firmly held together and transverse splitting or tearing is prevented.

In the drawings hereof I illustrate different forms in which the sections may be cut or made; but I wish it to be understood that they may be of any desired shape to produce a tube, covering, or conduit of any desired form in cross-section.

Figure 1 illustrates a sheet of the material from which the sections may be cut. Fig. 2 illustrates a view of the circular section cut into three parts, each of which is adapted to compose a covering, conduit, or insulating material, showing economy in the cutting and the utilization of the material to the best advantage. Fig. 3 illustrates a single wide section showing the ends of the wires or cords which run through all the sections. Fig. 4 illustrates a portion of a completed tube, covering, or conduit on a mandrel or rod, upon which this form may be conveniently made. Fig. 5 illustrates a vertical section of a tubu-

lar covering, showing the air-spaces formed around the pipe at each of the narrow sections. Fig. 6 illustrates a form of section which may be advantageously employed in making double half-round conduits.

Before describing the drawings I will briefly describe the method by which I make my products.

Any suitable material in sheet form—such as hair felt, asbestos fire-felt, asbestos paper, the product now known as “asbestos sponge,” or other suitable fibrous material—may be used, which may be as thin as paper or as thick as heavy felt—say, two inches or more—and it may be of any desired density or hardness, and I cut from the sheets, rings, half-round, or other shaped sections of such interior and exterior size as requisite to produce the desired product, some of them being, however, of less interior diameter than others. If a non-conducting tubular covering be the article desired, then the smallest inside diameter of any of the sections will be equal to the exterior diameter of the pipe to be covered. A succession of these rings or sections are then pressed against each other with or without adhesive material between their meeting faces, the sections having the larger interior diameter preferably alternating with those having the smaller diameter, thus forming them together into a tube with an irregular interior surface, or, if the sections be not ring-like in form, then they will be placed upon one another so that they will properly register with each other in outline, and then they will produce a trough-like, half-round, or other shaped covering or conduit. The means for attaching the sections together may be adhesive material, stitching or longitudinally-extending cords, threads, or wires, which engage with the several sections from end to end of a length of covering or conduit, thus binding all the sections together. This has the great advantage of practically preventing cracking or splitting of the sections in the event of the structure being bent to a considerable degree either accidentally or intentionally, and also the coverings or conduits may be made to turn corners—in other words, to have angles and sharp curves in them—by making the sections at the curves or corners wedge-shaped. The adhesive ma-

material used may be paste, gum, silicate of soda, shellac, glue, rubber solution, or any suitable adhesive material. Sometimes a fire-proof material will be preferred, sometimes a waterproof one, and sometimes neither of these features will be essential, simply an adhesive or holding material, and I prefer to use wire as the means for longitudinally connecting the sections together, the ends of the wires being suitably fastened. Holes for the reception of the wires may be conveniently made in the several sections at the same time that they are cut from the sheet, or, in many instances, the points of the wires may be sharpened, so that during the assembling of the sections the wires will pierce them, or needles or other devices may be used to pierce the sections, whether wire or thread or cord be used.

In laying up or assembling the sections into tubular or other form, a mandrel or rod may be employed, upon which they are arranged and upon which they may remain, if desired, until the adhesive material, if used, be dry, when they will be firmly fastened together, and this mandrel or core may be rigid when making straight products, such as a metallic or wooden rod, or it may be flexible, such as rope or similar material. The flexible cores are especially desirable when curved products are desired, because then the core may extend around curves and sharp corners, connecting with rigid cores, if preferred, at each side of the curves or angles, and will readily adapt themselves to the withdrawing operation. When, however, the product is used as a non-conducting covering for pipes, the sections may be strung on the pipe itself, by being passed over its end and pressed into intimate contact with each other while on the pipe, so that the adhesive material previously applied to the sides of the sections will firmly bind them together, or if they are longitudinally held by cords or wires then such devices may be added during the operation of putting them over the pipe.

The sections, either before they have been made into tubular or other shape or afterward, may be split on one side, so that the resulting structure can be sprung upon and also removed from pipes, and if necessary they may be cut or made in two halves as sectional pipe-covering is now frequently made, and they may have flanges, if desired, whereby they can be conveniently held together when in position upon the pipe. When continuous tubes are desired for conduit purposes, for instance, which are relatively small in diameter, it will frequently be desirable to use considerable pressure in forcing the sections snugly together and also to employ the adhesive material between the sections and also the longitudinally-running cords or wires.

The rings or sections, whatever their shape, may be cut with dies, and where they are of large diameter the central portions cut out from them may be in turn used for making

sections for smaller coverings or conduits, and the small center-piece which ultimately remains may be used as an insulated covering for a wire or cable, being punctured, strung upon the wire or cable, and pressed firmly together and attached as before stated.

Referring now to the drawings, A, Fig. 1, represents a sheet of the fibrous material from which the sections are cut.

B shows the ring-like sections.

CC illustrate what I call "double" sections for conduits, such as shown in Fig. 6.

E E, &c., (see Figs. 3, 5, and 6,) illustrate the wires or cords extending longitudinally through the various sections.

F, Fig. 4, illustrates a rod or mandrel upon which the sections may be assembled.

In Fig. 2 I show a plan view illustrating how several sections of covering differing in size may be made by utilizing the several parts or "punchings" of the successive pieces. *a* shows a section adapted to a large covering or conduit; *b*, a smaller one made from the punching from the large one *a*, and *c* a solid section adapted to be strung upon wire or cable as insulation for it. It will, of course, be understood that this principle may be carried on to a greater or less extent, depending upon sizes, &c., of the products desired.

In Fig. 5 I show the construction in cross-section. In it every alternating section B' is made of greater interior diameter than the others, their exterior diameters being the same. This results in annular air-spaces H H surrounding the pipe. The alternation of the sections is not essential. Those having greater interior diameter may be less frequent.

In Fig. 6 I show flanges I I formed upon the sections, whereby they may be conveniently attached to walls and ceilings of buildings. It is not essential that these flanges be employed. They are convenient, however, in many instances.

The advantages of my method and product are many, among them the following: Sectional non-conducting coverings as now made from fibrous materials are composed of sheets coiled up or cast into tubular form, ordinarily about three feet in length. This form has various objections—great variation in thickness, expensive construction, escape of heat at the longitudinal joints, waste of material by reason of unused ends, and canvas and bands or sewing is required to hold the covering together. In my invention, when used for non-conducting coverings, the rings or sections can be cut by dies or otherwise formed to the exact sizes, exterior and interior. The covering is applied so that there are practically no joints. That is to say, each section is so sealed to the adjoining sections that the joint may be more tight than the body of the section itself. Thus there is no separation at joints and no leakage thereat, and this form of covering requires no canvas or other exterior covering except for ornament or to prevent abrasion, and it may be handsomely

finished with paint, whitewash, or sizing, and it may be made into pieces of any required length or built up upon the pipe, so as to be an unbroken covering from end to end, passing through the floors of buildings where required, so that from the basement to the upper floor the pipe will be covered with an unbroken, seamless, non-conductor. I prefer to make the sections which bear upon the pipe or other hot surface of some fireproof or substantially fireproof material, such as asbestos fabric of some sort, although other material may be mixed with the asbestos. In fact, whether the products to be used for non-conducting or insulating purposes, I prefer to make them of material which is partially, at least, incombustible, and in many instances I prefer to employ a practically pure asbestos fabric or material, and for insulating conduits I prefer an asbestos or mica material, because they are unaffected by corrosion or moisture and are fireproof.

As above stated, I ordinarily prefer to make the sections by cutting them from sheets of

the desired material; but I wish it understood that they may be made in any preferred manner, and sometimes it will be more advantageous to mold, coil, or otherwise fabricate them; also a straight piece of material may be bent into the curved or ring-like form and then when the sections thus formed are cemented together, especially if joints be broken, a product will result substantially the same as though the sections were made in ring-form in the first instance.

Having described my invention, I claim—

A non-conducting covering, conductor or conduit, formed of a series of separate sections of the desired shape, held together side by side, the interior diameters whereof differ, for the purposes set forth.

Signed at New York, in the county of New York and State of New York, this 24th day of February, A. D. 1894.

ROBERT H. MARTIN.

Witnesses:

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GEORGE T. ERHARD.