J. B. FORSYTH.

Vulcanizing Hose or Tubing.

No. 168,087 Patented Sept. 28, 1875.

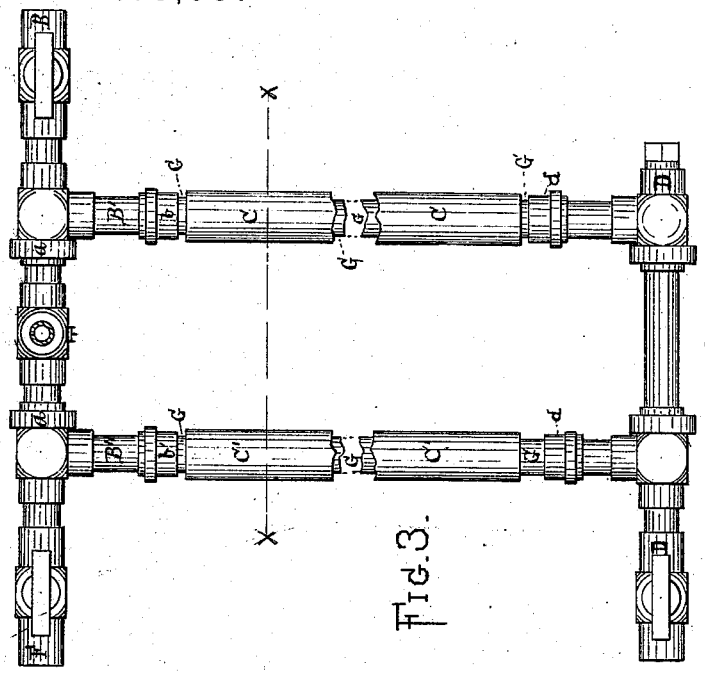

FIG. 3.

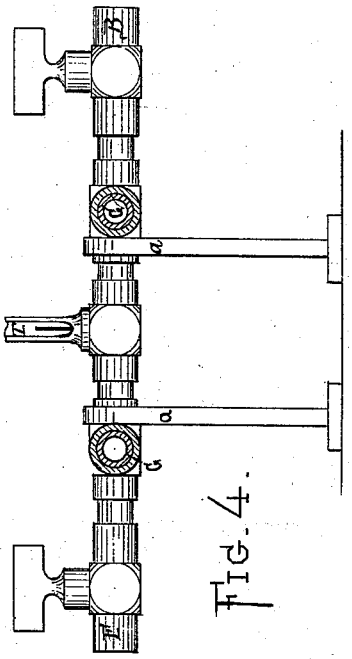

FIG. 4.

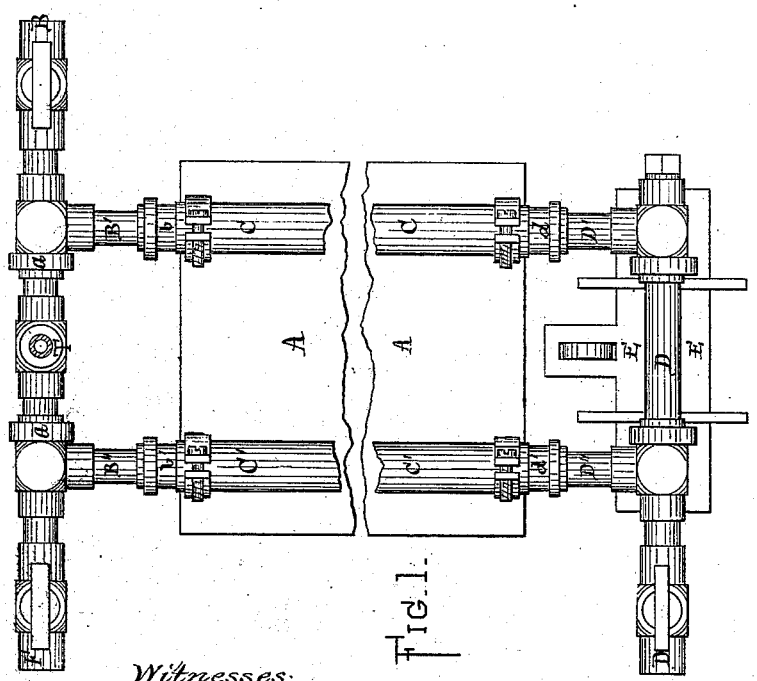

FIG. 1.

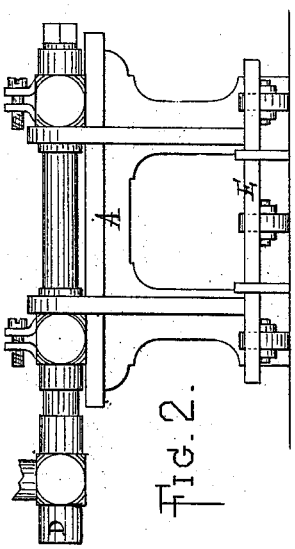

FIG. 2.

Witnesses:

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UNITED STATES PATENT OFFICE.

JAMES B. FORSYTH, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN VULCANIZING HOSE OR TUBING.

Specification forming part of Letters Patent No. **168,087**, dated September 28, 1875; application filed January 2, 1875.

To all whom it may concern:

Be it known that I, JAMES BENNETT FORSYTH, of Boston, Massachusetts, have invented an Improvement in the art of Vulcanizing Rubber in the form of hose or tubing, of which the following is a specification:

Heretofore it has been customary, in order to vulcanize the rubber used in the manufacture of hose or tubing, to place the hose or tubing on a carriage, which is run into a large heater or cylinder, the door of which is closed and made steam-tight. The heater is then filled with steam, and the goods are vulcanized. This process is slow and expensive, as it requires nearly an hour to raise the heat to the desired temperature, and the goods are kept from three to five hours in the heater, according to the temperature and compound used.

Hose or tubing, as a general thing, is made in fifty-feet sections, and, as it is desirable not to double or fold these sections during the vulcanizing process, it is necessary to have a carriage long enough for the sections, and a heater or cylinder long enough to receive the carriage. The heater or cylinder must be made strong enough to bear safely a pressure of eighty or ninety pounds to the square inch. This apparatus is consequently very expensive, both in first cost and also in respect to the quantity of steam it requires.

By my improved process expensive carriages, heaters, or cylinders are unnecessary, and a very large saving in steam is made, and the manufacture of hose or tubing is carried on very economically and expeditiously.

In preparing a tube from a thin sheet of any suitable vulcanizable compound, I first make a strip of the sheet into a tube upon what is known as a "pole" in rubber factories, which is, in fact, an iron pipe. I then wrap this tube while upon the pole with two or three layers of cotton cloth, after which I connect the pole with the vulcanizing apparatus, which consists of proper couplings and a steam-pipe and a blow-off pipe, each provided with the proper valves. Steam is then let into the hollow pole gradually until the temperature is raised to the desired point, which, with such compounds as are ordinarily used, is from 280° to 300° Fahrenheit. This may safely be done in about five minutes. The outlet-pipe should then be opened to let off the water of condensation, and should be opened at intervals during the process. A steam-trap is convenient for this purpose. The heat should be kept at the desired height for from twenty to forty-five minutes—the greater the heat the shorter the time. The thermometer by which the heat is indicated should be in the inlet-pipe, near the coupling. The inlet-valve is then closed, the outlet-valve opened, and the pole removed from the apparatus. The wrappings are then removed, and the tube is taken off of the pole. Care should be taken to bind the tube closely upon the pole, as otherwise the current of air might pass between the pole and the tube, which would greatly retard the process.

The main object of using the pole is to prevent the distending strain which would otherwise be brought upon the tube. When the tube in itself, or with the aid of the covering, is strong enough to resist this strain, and the strain is not otherwise injurious, I dispense with the pole, and connect the tube directly to the couplings. In all other respects the process is the same. For example, that class of hose which consists of a tube of stout textile fabric, and a tube of vulcanizable compound (whether with or without fibrous material) properly disposed within it, or of a strip of stout textile fabric coated upon one side only with the vulcanizable compound, and afterward formed into a tube by lapping its edges and securing them by sewing, riveting, or cementing, does not (unless of extra large size) require wrapping, the textile fabric forming in itself a sufficient covering to prevent the undue cooling of the exterior of the thin rubber tube, such as is commonly used, when the temperature of the surrounding atmosphere is as usual in rubber factories. Accordingly I vulcanize the rubber tubing of this class of hose by coupling the steam-pipe to the hose at one end and the blow-off pipe to it at the other end as it lies upon the bench, and then raising and keeping up the heat, as above described.

My process is particularly valuable in the manufacture of this class of hose, both because of its economy and also because the exterior textile fabric is neither discolored nor weakened. When hose of this class is extra large, say, over two and a half inches in diameter,

or when the exterior textile fabric is light, an extra wrapping is required. Any covering will answer which will not conduct the heat away from the exterior of the tube to be vulcanized.

When the tube of vulcanizable compound is very thin the covering may also be thin; but when this tube is thick, say, over one-eighth of an inch thick, great care must be taken to cover it well.

The apparatus requisite for the proper practicing of the above process is illustrated in the accompanying drawings, making part of this specification.

In Figures 1 and 2, A is a table upon which the hose rests. B is the main inlet-pipe, through which the steam from the boiler enters the branch inlet-pipes B′ B″. *b b′* are couplings, to which one end of the hose C C′ is clamped. T is a thermometer. D is the main outlet-pipe, which is connected to the hose by means of the branch outlet-pipes D′ D″ and the couplings *d d′*. I prefer to mount this pipe D and its adjuncts, so that it may move sidewise, as the hose usually increases in length under the internal pressure to which it is subjected, and for this purpose I mount the pipe D upon the carriage E, as shown in the drawings. F is a second inlet-pipe, which may be used to admit water into the hose when desirable.

The combination of the pipes B and D with the hollow mandrel G, as shown in Figs. 3 and 4, constitutes one part of my invention. The pipes B F, in Figs. 1, 3, and 4, are supported by the standards *a a*, and the pipe D, in Fig. 3, is supported in the same way.

What I claim as my invention is—

1. The improved process above described for vulcanizing tubing by means of heat applied internally, as described, while the tubing is covered, as set forth.

2. The combination of the hollow mandrel G, the pipes B and D, and couplings *b* and *d*, arranged together as described.

3. The combination of the pipe B, couplings *b* and *d*, pipe D, and carriage E, arranged together as described.

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Witnesses:
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