

(No Model.)

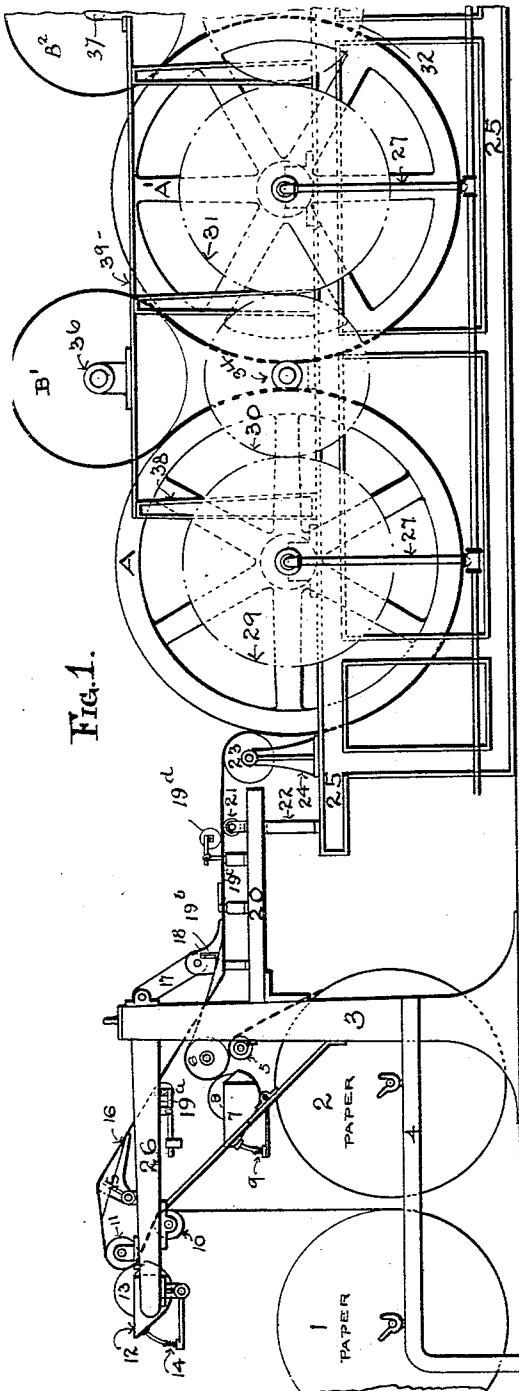
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F. L. BAKER.
TUBE MACHINE.

No. 557,636.

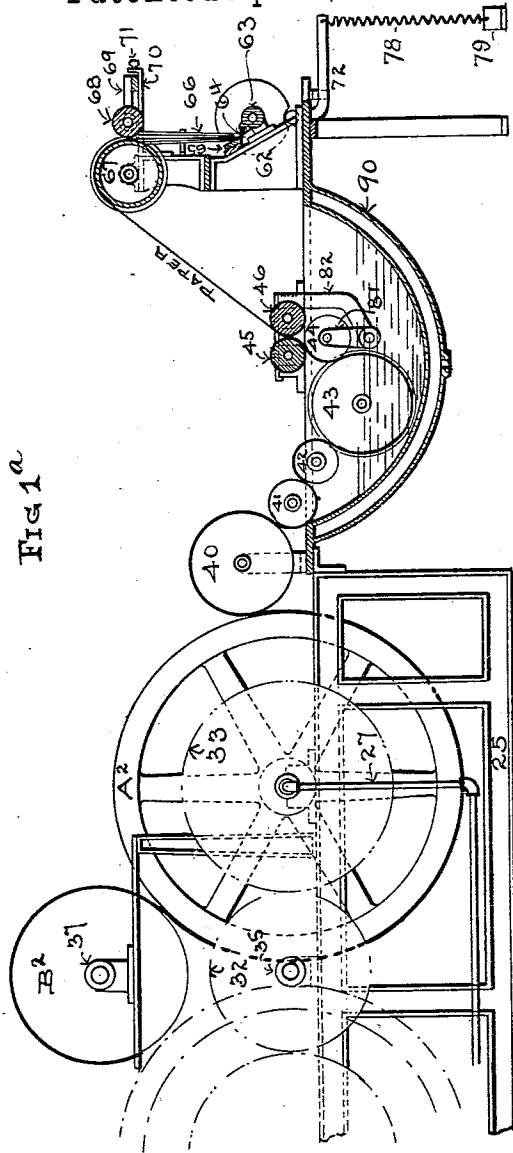
Patented Apr. 7, 1896.

FIG. 1.



WITNESSES.
W. H. Riley
Geo. J. Satterthwait

FIG. 1^a



INVENTOR.
Frank L. Baker

(No Model.)

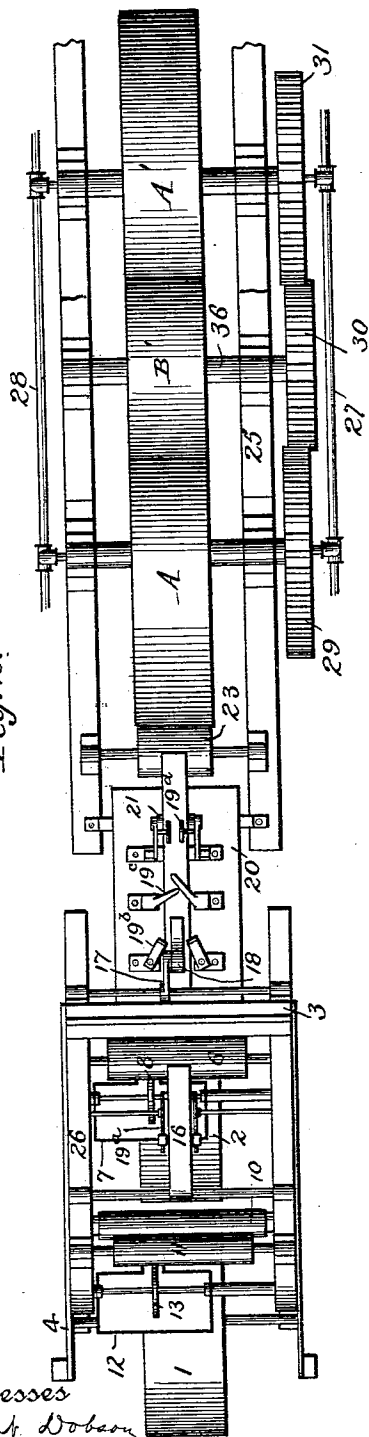
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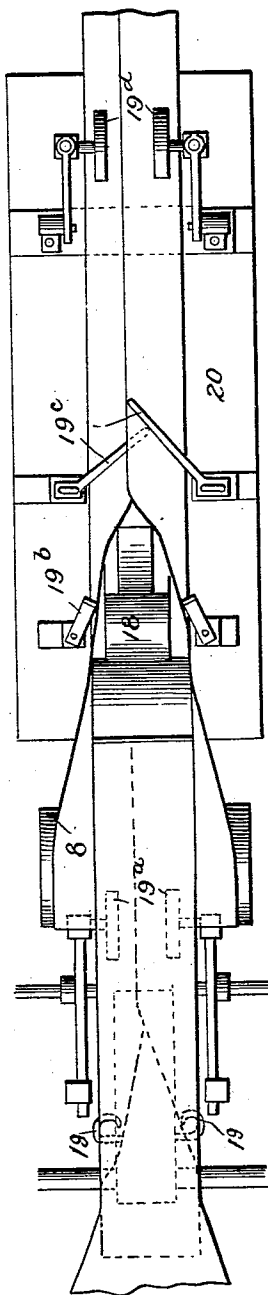
Patented Apr. 7, 1896.

Fig. 2.



Witnesses
A. S. Dobson
J. A. Fairgrave

Fig. 4.



Inventor
Frank L. Baker
By
Lucien Freeman
Attorneys

(No Model.)

3 Sheets—Sheet 3.

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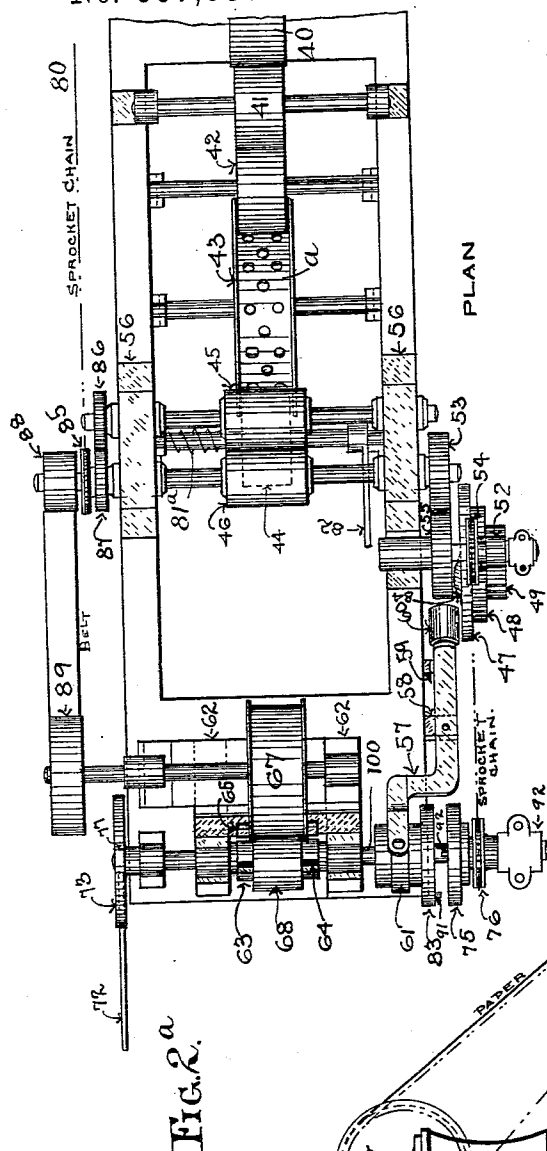
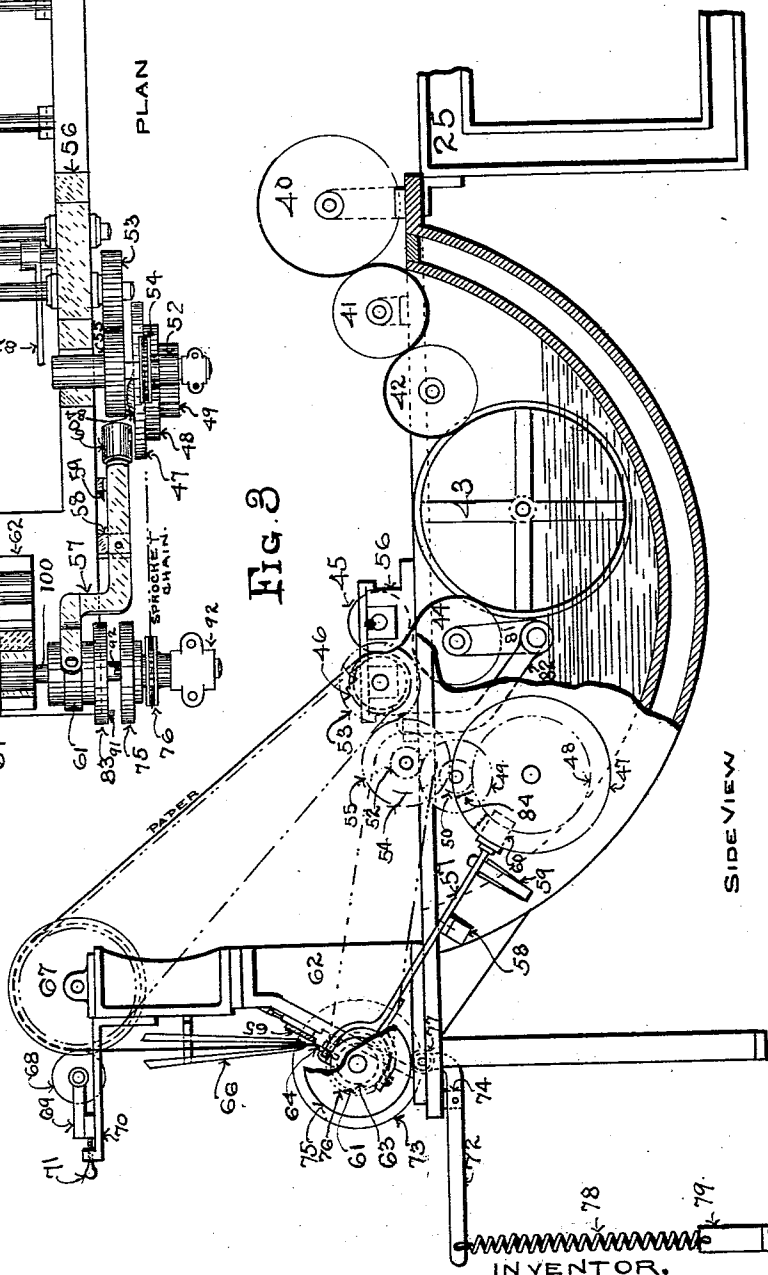


Fig. 3



WITNESSES.
W. H. Riley.
Geo. J. Satterthwaite

INVENTOR.
Frank L. Baker

UNITED STATES PATENT OFFICE.

FRANK L. BAKER, OF WILMINGTON, DELAWARE, ASSIGNOR TO THE
DIAMOND PAPER BAG COMPANY, OF SAME PLACE.

TUBE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 557,636, dated April 7, 1896.

Application filed April 5, 1894. Serial No. 506,490. (No model.)

To all whom it may concern:

Be it known that I, FRANK L. BAKER, a citizen of the United States, residing in Wilmington, New Castle county, Delaware, have invented certain new and useful Improvements in Tube-Machines, of which the following is a specification.

My invention relates to tube-machines, and more especially to a machine adapted to make a double tube—that is, one tube within and embraced by the other—and while it is applicable to making tubes from various materials it is especially designed for the manufacture of paper tubes; and it has for its object to provide means whereby a continuous double tube having the seams or points of union on reverse sides may be quickly and readily formed, and the tube may be coated with any suitable material and delivered in a finished state, complete and perfect in form and construction and of desirable lengths; and to these ends my invention consists in the various features of construction and arrangement of parts having the mode of operation substantially as hereinafter more particularly pointed out.

Referring to the accompanying drawings, wherein I have illustrated one preferred embodiment of my invention, Figures 1 and 1^a are side views, partly in section, of a complete machine or apparatus for forming, coating, and delivering the tubes. Figs. 2 and 2^a are plan views of the machine. Fig. 3 is an enlarged side view, partly in section, of the coating apparatus, as well as the adjunctive devices; and Fig. 4 is an enlarged plan view of the tube-forming devices.

One of the main objects of my present invention is to provide a machine whereby the material forming the two tubes, the one within the other, may be simultaneously fed into the machine, folded into tube form, the one over the other, so that the seams of the tubes shall be opposite each other, and after the tubes are formed and pressed together to dry the same, coat the tube with a suitable waterproof or other coating, and deliver the same in proper lengths, and in doing this I provide two tube-forming devices and arrange them in reverse relation to each other, and also ar-

range all the parts of the machine so that as the tube passes through it is kept under continual pressure in order to prevent air getting into the tube, which has the effect of distorting the tube and causing it to be delivered out of proper shape and possibly with openings and leaks, which render it unsatisfactory in use.

The main purpose of my invention is to provide blasting-tubes; but of course it will be understood that the tubes may be used for any purpose for which they are adapted, and while I have shown and described a machine for making a double tube it will be understood that the same principles apply and extend to make a tube of more than two thicknesses.

Referring now to the drawings, 1 and 2 represent rolls supplying paper or other material to the machine, and this paper may be suitably treated to render it water or fire proof, or otherwise, and I generally prefer to supply the paper from roll 1 in this condition. These rolls are mounted on suitable bearings on an arm or support 4, connected to the uprights or supports 3 of the machine, and the paper from the roll 2 passes over a guide-roll 5, thence over a roll 6, and paste is supplied to the paper from the paste-vat 7 by a roller 8, which is adjustable by a screw 9, or other similar pasting apparatus, and the paper is led forward to the former. The paper from the roll 1 passes over a similar guide 10, a roller 11, the paper receiving paste from the roll 13 in the vat 12 and adjustable by a screw 14, and thence to its former. These tube-formers 15 and 18 may be of any suitable construction, and the former 15 is shown as mounted on the arms 26, projecting from the standards 3 and is arranged with its heel or bending face upward, so that the edges of the paper are naturally drawn downward and inward and folded over each other in a well-known way to form the tube, and the tube is led downward under the former 18, between it and the paper from the roll 2.

The former 18 is arranged with its heel or bending face downward, so that the edges of the paper will be turned up over the former and over and inclosing the first tube, and I

have shown the former as supported by a link 17 from the standard 3.

Any suitable adjunctive devices to aid in folding over the edges of the paper to form the tube may be used—as, for instance, the fingers or guides 19, the gravity-pressure rolls 19^a, the fingers 19^b and 19^c, the pressure or guide rolls 19^d, and the supporting-roller 21, although any other well-known and equivalent devices for forming and completing the tube may be used—the essential feature of my invention in this regard being that the tube-forming devices are arranged in reverse relation to each other—that is to say, the paper forming one tube will be folded downward around and over the former having its seam on the under side, and then be fed forward under the next tube-forming device, where it is inclosed by the paper forming the other tube, which paper is folded upward and over the second former so as to inclose the first tube, and to have its seam on the upper side of the tube, or on the reverse side to that of the first tube.

In the present instance the second tube-forming adjuncts are shown as mounted on a platform 20, which has an additional support 22, bearing on or connected to the frame 25 of the heating and drying apparatus, although this, of course, is not an essential feature of construction, and other equivalent arrangements may be used.

As before intimated, it is very essential that the double tube should be kept under constant pressure from the time it is formed until it is delivered in its completed state to prevent the air from getting into the tube and causing bulges or irregularities in the shape or even disrupting the tube, which is likely to occur as it is fed through the apparatus, and coated and formed into suitable lengths, and I have shown a drying apparatus as well as a coating apparatus connected to the tube-forming devices in such a manner that all parts of the tube are always under continuous pressure as it passes through the machine. Thus the drying apparatus which is mounted on the frame 25 is provided with standards 24, upon which is mounted a roller 23 which is adapted to be adjusted with relation to the tube-forming devices, so that the moment the tubes are formed and pass from the final former the tube is under stress or strain over the periphery of the roller 23. This roller is arranged to bear upon the periphery of a drying-roll A, there being a series of rolls A A' A², &c., and intermediate connecting-rolls B' B². These drying-rolls may be suitably heated, as by steam-pipes 27 28, connected with a suitable source of supply, and they are driven at a uniform rate of speed by the gears 29 31 33 and the intermediate gears 30 and 32 suitably mounted on studs or bearings 34 35 supported on the frame of the machine. The intermediate rolls B' B² are mounted in bearings 36 37 on an elevated

portion of the frame 39, supported by suitable standards 38 from the main frame 25. It will be noticed that these drying-rolls or cylinders are arranged so that the tube is at all times under pressure, bearing either upon the face of the cylinders A A' or the intermediate rolls B' B² and leaving the face of one for that of the other at a point of contact between the rolls, so that under no circumstances can air get into the tube as it is passing through the machine. It is taken from the final roll or cylinder A² over a roll 40, which is arranged to bear upon the periphery of the cylinder A², and thence is passed through the coating apparatus, where it is still under pressure, the rolls 41 42 being arranged to convey the tube from the roll 40 to the submerging-roll or pulley 43, while the roll 44 bears against the rolls 43 and 45, and the latter bears on roll 46, thus keeping the tube under pressure until finally coated.

The submerging-roll or pulley 43 is preferably provided with flanges on its edges, as best seen in Fig. 2^a, and its surface is provided with holes or openings *a* to permit the material in the vat to flow through the pulley and to cover the face of the tube, which is held in contact with the face of the pulley while the other face is being coated by the material in the vat. This pulley or submerging-roll, having a perforated face or periphery, is one of the essential features of my invention, as it will be seen that the tube is held in contact with the face of the pulley in order to carry out the idea of preserving it under pressure continuously, and it is necessary that the coating material should be applied through the orifices or perforations in the periphery of the pulley to one side of the tube.

The roll 44 is supported on a rock-arm 81, which in turn is supported in brackets 82, the roll being under spring-tension, as by a spring 81^a, causing it to bear on the pulley 43 and one of the drawing or feeding rolls 45, the rolls 45 and 46 acting as the drawing or feeding rolls for the apparatus and keeping the tube under continuous tension from the time it is formed until it is completed, dried, and coated. It then remains simply to sever the tube into proper lengths, and while, as before stated, it may be made in various forms, I have shown an arrangement for severing it into lengths, say, of twelve feet, suitable for blasting-cartridges, and as the tube leaves the feed-rolls 45 and 46 it passes over the roller 67 and between the tension-roll 68, mounted in bearings 69 on the arm 70 and adjustable by a screw 71, and thence it passes between the guides 66 to the cutters 64 and 65, the latter of which is shown as stationary, while the former rotates at intervals through any suitable mechanism.

While various means may be used for accomplishing the results hereinbefore pointed out, in the present instance I arrange that 35

shall be the drive-shaft, providing it with any suitable means of propulsion, and this by means of the gears 32 and the connected gears operates the cylinders of the drying-machine.

5 The feed-rolls 45 46 are driven from this shaft 35 by a sprocket-chain 80, connected to a sprocket-wheel 85, mounted on the shaft of the roll 46, and also mounted on this shaft is a pinion 87, connecting with the pinion 86 on the shaft of the feed-roll 45, so that the feed-rolls rotate in opposite directions. Also mounted on the shaft is a pulley 88, connected by a belt to a pulley 89 on the shaft of the roll 67, so that this roll is driven in unison and proper time with relation to the feed-rolls.

In order to operate the cutting mechanism at the proper time, I have shown a pinion 53, mounted on the shaft of the feed-roll 46, meshing with a pinion 55, which is mounted on a short shaft carrying a sprocket-wheel 54, which is connected by a suitable chain to a similar sprocket-wheel 76 loosely mounted on the shaft 100, and connected to the sprocket-wheel 76 is one portion, 75, of a clutch mechanism, while the other portion, 83, is loosely mounted on the shaft, and these two portions carry clutch devices 91 92, by means of which they may be engaged. The portion 83 of the clutch is keyed to the shaft 100, so that when it rotates the shaft will rotate with it, but it can be moved longitudinally of the shaft, and when the clutches are engaged the shaft 100 will rotate, carrying with it the cutter 64, severing the tube between the said cutter and the fixed cutter 65. The shaft 100 is also provided at its end with a disk 73, having a notch in its periphery, in which normally rests a friction-roll 77, supported on a lever 72, pivoted at 74 and provided with a spring 78 secured to an abutment 79, the purpose of which is to insure the stopping of the shaft 100 at a proper position, so that the cutters will be in proper relation to one another.

45 In order to operate the clutch portion 83, I provide a band 61, which is pivotally connected to an arm or lever 57, pivotally mounted on a bearing 58 and normally under stress of a spring 59 to maintain the clutch portions separated, and preferably carrying on its end a friction-roller 60, projecting in relation to a cam-wheel 47, provided on its face with a cam 84. This cam-wheel is connected to a pinion 48, which is driven by a pinion 50, which in turn is driven by a pinion 49 on the same shaft, meshing with pinion 52, connected to be driven by the pinion 55, and the connections are so proportioned that when the feed-rolls 45 and 46 have fed a sufficient length of the tube forward the cam 84 will come in contact with the friction-roll 60 and operate the lever 57 to cause the clutch parts to become engaged and rotate the cutter to sever the tube length desired, and it will be understood, of course, that by changing the

relations of this intermediate train of gears various lengths of tube can be severed, as desired.

It will thus be seen that with my apparatus two or more webs of paper or other material 70 can be simultaneously fed into the machine and to the formers, which latter are arranged with reverse relation to each other, so that the tube of one web will be folded over and under the former to make the one tube, and 75 the other web will be forward and over the next former and inclose therein the first tube, so that the seams of the two tubes will come opposite each other; and when the paper leaves the former, going to the drying apparatus, it is always under tension and pressure, being drawn forward by the feed-rolls 45 46 through the drying apparatus and through the coating apparatus, the latter being so connected and arranged that the tube is still 85 under pressure, and the pulley or submerging-roll being perforated on its periphery to allow the coating to be applied to the side of the tube bearing on its periphery, while the outer portion is being coated from the fluid 90 in the vat and preventing any danger of air getting into the tube to disrupt it to distort it. From this portion the tube may be fed and delivered in any desired manner, and, if necessary, it can be delivered to the cutting apparatus and severed into lengths of any desired size. 95

What I claim is—

1. In a double-tube-forming machine, the combination with a former over which a strip 100 of paper is formed into a tube, of a second former under which the tube of the first former passes and around which another strip of paper is formed into a tube inclosing the first tube, the two tube-formers being reversely arranged with relation to each other and separate and independent of each other, substantially as described. 105

2. In a double-tube-forming machine, the combination with the tube-formers reversely 110 arranged with relation to each other, of the drying-rolls arranged to receive the double tube from the formers and to maintain it constantly under pressure, a coating apparatus connected to the drying apparatus to 115 also receive and maintain the tube constantly under pressure, and tension-rolls for positively drawing the tube through the coating, drying and tube-forming mechanism and maintaining it under tension or pressure 120 throughout the operation, substantially as described.

3. In a double-tube-forming machine, the combination with two tube-formers reversely arranged with relation to each other, of the 125 drying-cylinders, a roll, as 23, to receive the tube from the formers and hold it in contact with the drying-cylinders, the coating apparatus, a roll, as 40, to guide the tube from the drying to the coating apparatus, the coat- 130

ing apparatus being provided with a submerged roll having a perforated periphery, the drawing-rolls arranged to draw the tube positively through the tube-forming, drying
5 and coating apparatus under pressure, and a cutter for severing the tube, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANK L. BAKER.

Witnesses:

GEORGE CARTER,
WILBUR L. SASSE.