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MACHINE FOR FORMING TUBING AROUND FIREWORK FUSE MATERIAL

Filed March 28, 1931

2 Sheets-Sheet 1

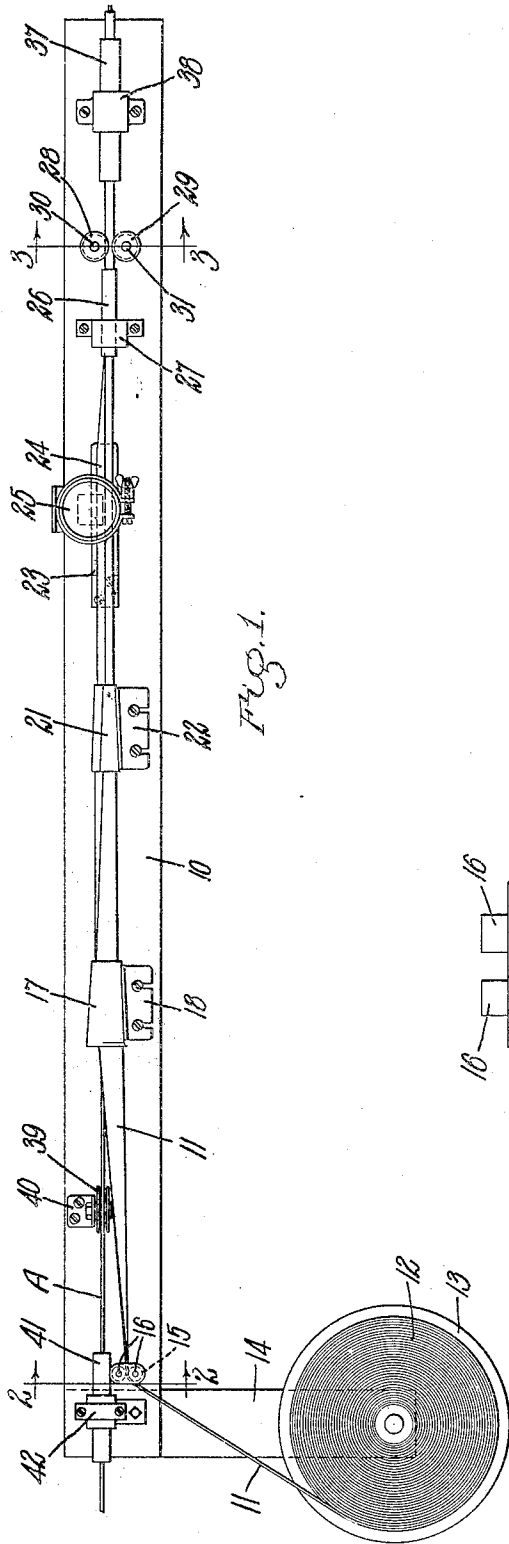


Fig. 1.

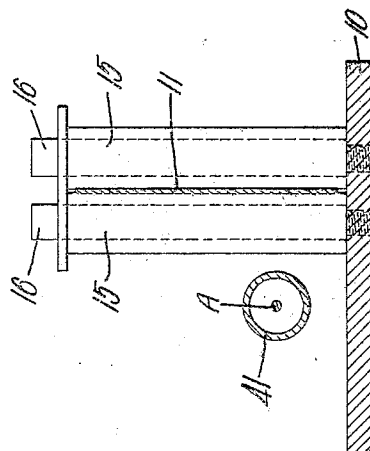


Fig. 2.

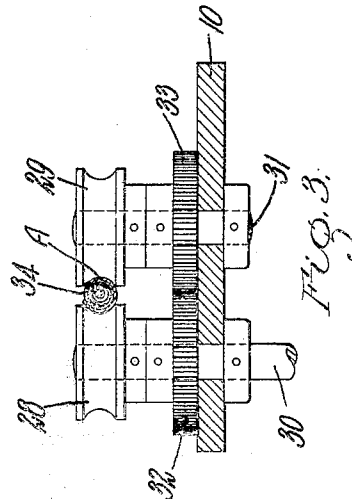


Fig. 3.

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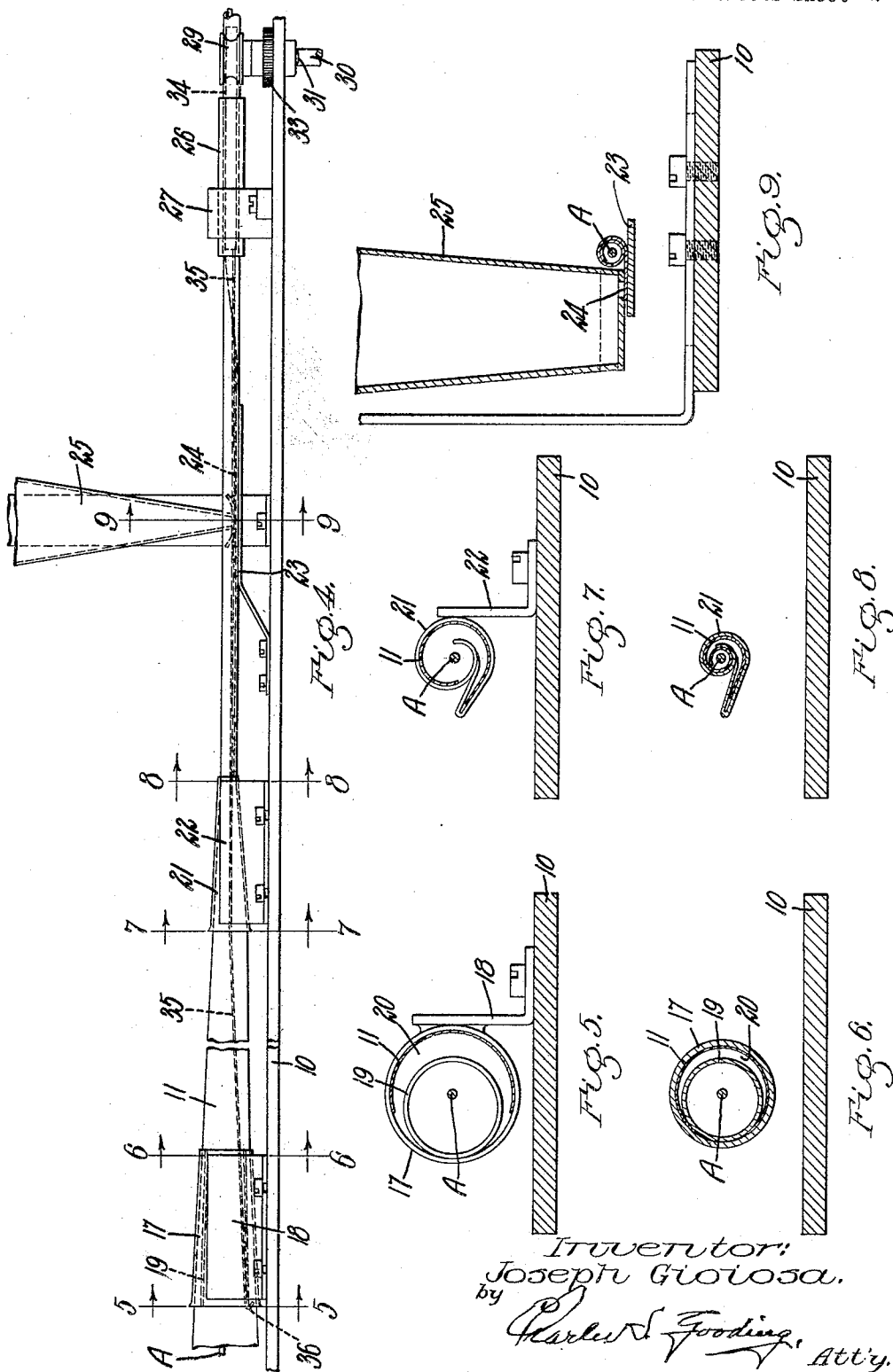
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MACHINE FOR FORMING TUBING AROUND FIREWORK FUSE MATERIAL

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2 Sheets-Sheet 2



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UNITED STATES PATENT OFFICE

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MACHINE FOR FORMING TUBING AROUND FIREWORK FUSE MATERIAL

Application filed March 28, 1931. Serial No. 526,108.

This invention relates to a machine for forming tubing around firework fuse material.

In constructing exhibition fireworks, commonly known as set pieces, the fuse material which connects the various display units is protected to a certain extent by being enclosed in a paper tubing, and insofar as applicant is aware, up to the present time the fuse material has first been cut into the lengths desired and the paper wrapped by hand therearound.

The object of this invention is to provide a machine of simple construction which will quickly and effectively form a continuous length of paper tubing around a continuous length of firework fuse material.

Another object of the invention is to provide a plurality of tube forming members of novel construction, these forming members being so constructed and arranged that they will first bend an endless strip of paper into semi-tubular form, then into spiral form, and finally into tubular form with at least two thicknesses of material forming the tube.

The invention consists in a machine for forming tubing of sheet material around firework fuse material as set forth in the following specification and particularly as pointed out in the claims thereof.

Referring to the drawings:

Fig. 1 represents a plan view of the machine embodying my invention.

Fig. 2 is an enlarged transverse section taken on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged transverse section taken on the line 3—3 of Fig. 1.

Fig. 4 is a front elevation of a portion of the parts illustrated in Fig. 1.

Fig. 5 is an enlarged transverse section partly in elevation taken on the line 5—5, Fig. 4.

Fig. 6 is an enlarged transverse section taken on the line 6—6, Fig. 4.

Fig. 7 is an enlarged transverse section partly in elevation taken on the line 7—7, Fig. 4.

Fig. 8 is an enlarged transverse section taken on the line 8—8, Fig. 4.

Fig. 9 is an enlarged sectional elevation taken on the line 9—9, Fig. 4.

Like numerals refer to like parts throughout the several views of the drawings.

In the drawings, 10 is a frame constructed in the form of a rectangular plate and 11 is a strip of paper leading from a roll 12 of said paper, said roll being mounted upon a rotary table 13 which, in turn, is supported upon an extension 14 of the frame 10. From the roll of paper 12 the strip 11 is fed between a pair of vertical guide members 15 preferably formed of rubber and mounted upon vertical studs 16.

From the guides 15 the strip of paper 11 passes to and through a frusto-conical forming member 17 which is mounted upon a bracket 18, in turn supported upon the frame 10. The frusto-conical member 17 tapers in the direction toward which the sheet material is fed. Mounted within the frusto-conical member 17 and positioned eccentrically with relation thereto is a frusto-conical guide member 19, the outer periphery of which is secured to the inner surface of the frusto-conical member 17. By mounting the member 19 within the member 17 a crescent-shaped space 20 is formed within the guide member 17 and it is through this space that the strip of sheet material 11 passes; and when said strip emerges from the forming member 17 it is bent into semi-tubular form, see Figs. 5 and 6.

From the forming member 17 the strip of sheet material 11 passes to a spiral forming member 21 mounted upon a bracket 22 in turn supported upon the frame 10. The forming member 21 tapers longitudinally thereof in the direction toward which the strip of sheet material is fed and is spiral in cross sectional contour, see Figs. 7 and 8. As the strip of sheet material 11 is fed into and through the forming member 21 it is progressively bent into spiral form and reduced in diameter, and one edge portion of the strip of sheet material assumes a tubular formation while the remainder of the strip extends laterally therefrom in the form of a spiral, see Fig. 8.

From the forming member 21 the partially formed tubing extends to a support 23 and as the unformed part of said strip passes

across the upper surface of this support a suitable adhesive contained within a reservoir 25 is applied at 24 to the upper surface of the strip. The strip is then fed to a cylindrical tubular forming member 26 mounted upon a bracket 27 in turn supported upon the frame 10, and as the strip enters this last-named forming member the unbent portion of the strip with the adhesive material thereon is bent against the adjacent previously formed tubular portion of the strip to complete the tubing, so that when the completed tubing finally emerges from the forming member 26 said tubing will consist of two or more layers of sheet material.

The strip of sheet material 11 is fed through the various forming members by means of feed rolls 28 and 29 which are located upon opposite sides of the completed tubing adjacent to the point where said tubing emerges from the forming member 26. The feed rolls 28 and 29 are formed of rubber, or other suitable material, which will frictionally engage the tubing and exert a strong pulling action thereon. The rolls 28 and 29 are rigidly fastened to a driving shaft 30 and countershaft 31 respectively, and said shafts are connected together to rotate in unison by gears 32 and 33. The driving shaft 30 may be driven in any suitable manner.

To prevent the completed tubing from collapsing between the feed rolls 28 and 29, a tubular member 34 is positioned within the completed tubing, said tubular member 34 extending from a point within the cylindrical forming member 26 to a point beyond the feed rolls. The tubular member 34 is prevented from being drawn forwardly by means of the feed rolls by being connected by means of a wire 35 with the forming member 17, where a hook portion 36 formed upon the wire is attached to the rear end of the forming member 17, see left hand end of Fig. 4.

In order to insure that the portion of the strip of sheet material to which the adhesive is applied is securely stuck to the remainder of the strip, the tubing is fed through one or more tubular members 37 each mounted in a bracket 38 in turn mounted upon the frame 10, it being evident that the inner surface of this tubular member 37 provides a wiping action to force and hold the adhesive portion of the strip against the adjacent previously formed tubular portion of said strip.

An endless piece of fuse material A, well known in the art, is fed by means of the completed tubing through the various tube-forming members and the strip of sheet material 11 is bent around the fuse as the latter passes through the forming members. The strip of fuse material A is guided into the forming member 17 by means of a guide roll 39 mounted upon a bearing 40, being guided to said guide roll through a tubular guide

member 41 mounted in a bracket 42 supported upon the frame 10.

The general operation of the mechanism hereinbefore specifically described is as follows:—Assuming that the strip of sheet material 11 has been threaded successively through the forming members 17, 21 and 26 and at the same time formed into a tube around the continuous piece of fuse material A, the feed rolls 28 and 29 are started in operation to pull the strip of sheet material through the forming members. As the strip of sheet material 11 passes through the frusto-conical forming member 17, the flat strip of sheet material is bent into semi-tubular form and at the same time caused to taper slightly in the direction toward which it is fed. From the forming member 17 the partially formed tubing is fed to the spiral forming member 21 where it is still further bent to entirely enclose the strip of fuse material and to assume a spiral cross sectional form which, furthermore, also tapers in the direction toward which it is being fed. After leaving the forming member 21 the partially formed tubing passes above the support 23 and an adhesive material is deposited upon the surface 24 of the strip that still remains flat, after which it enters the cylindrical tubular forming member 26 and is caused to assume its final tubular form. Furthermore, as the sheet material passes through the tubular member 26, the portion of the sheet material that has had the adhesive material applied thereto is caused to adhere to the adjacent portion of the tubing with which it is forced into contact. Finally, to insure that the adhesive portion of the sheet material is thoroughly stuck, the tubing is caused to pass through one or more other tubular members 37 as may be necessary, the adhesive material drying quickly as the tubing passes therethrough, and the wiping action of the interior surface of the tubing 37 will effectively hold the portion of the strip covered by the adhesive against the adjacent surface of the paper with which it is forced into contact. As the tubing is fed through the various forming members, a strip of fuse material will be pulled along in unison with the tubing and the strip of sheet material will be progressively formed around the fuse material.

I claim:

1. A machine of the character described having, in combination, a frusto-conical forming member, a spiral forming member, a hollow cylindrical forming member, and means to feed a strip of sheet material through said forming members whereby said strip is formed into a tube.

2. A machine of the character described having, in combination, a frusto-conical forming member, a spiral forming member, a hollow cylindrical forming member, and

means to feed a strip of sheet material successively through said conical, spiral, and cylindrical forming members whereby said sheet material is bent into tubular form.

tion, a frusto-conical forming member adapted to surround a continuous piece of fuse material and strip of sheet material, another forming member spiral in cross-sectional contour surrounding the fuse and sheet material, a cylindrical tubular forming member also surrounding the fuse and sheet material, means to apply an adhesive material to the sheet material, rollers frictionally engaging the completed tubing and adapted to pull the strip of sheet material through all of the tube forming members, and means to prevent the completed tubing from collapsing between said rollers.

In testimony whereof I have hereunto set my hand.

JOSEPH GIOIOSA.

5 3. A machine of the character described having, in combination, a frusto-conical forming member, a spiral forming member, a hollow cylindrical forming member, means to feed a strip of sheet material successively through said conical, spiral, and cylindrical forming members, whereby said sheet material is bent into tubular form, and means to apply an adhesive material to the sheet material during the feeding movement and prior to the final bending operation.

10 4. A machine of the character described having, in combination, a frusto-conical forming member, a spiral forming member tapering longitudinally thereof, a cylindrical tubular forming member, and means to feed a strip of sheet material through said forming members whereby said sheet material is bent into tubular form.

15 5. A machine of the character described having, in combination, a frusto-conical forming member, a spiral forming member, means to feed a strip of sheet material through said forming members, means to apply an adhesive material to the sheet material during its feeding movement, and means to force the adhesive portion of the sheet material against an adjacent portion of said strip and also finally bend the latter into tubular form.

20 6. A machine of the character described having, in combination, a frusto-conical forming member, a frusto-conical guide member eccentrically mounted therein, a forming member spiral in cross sectional contour and tapering longitudinally thereof, a cylindrical tubular forming member, means to feed a strip of sheet material through said forming members, whereby said material is formed into a tube, and means to apply an adhesive material to the sheet material prior to its passage through the tubular forming member.

25 7. A machine for forming tubing around firework fuse material having, in combination, a frusto-conical forming member adapted to surround a continuous piece of fuse material and strip of sheet material, another forming member spiral in cross-sectional contour surrounding the fuse and sheet material, a cylindrical tubular forming member also surrounding the fuse and sheet material, means to apply an adhesive material to the sheet material, and means to grip the completed tubing and pull the sheet material successively through the frusto-conical, spiral, and cylindrical tube forming members, whereby the sheet material is bent into tubular form around the fuse material.

30 8. A machine for forming tubing around firework fuse material having, in combina-

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