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METHOD OF AND MEANS FOR NEUTRALIZING ELECTROSTATIC
CHARGES ON MOVING TAPES AND THE LIKE
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FIG. 1

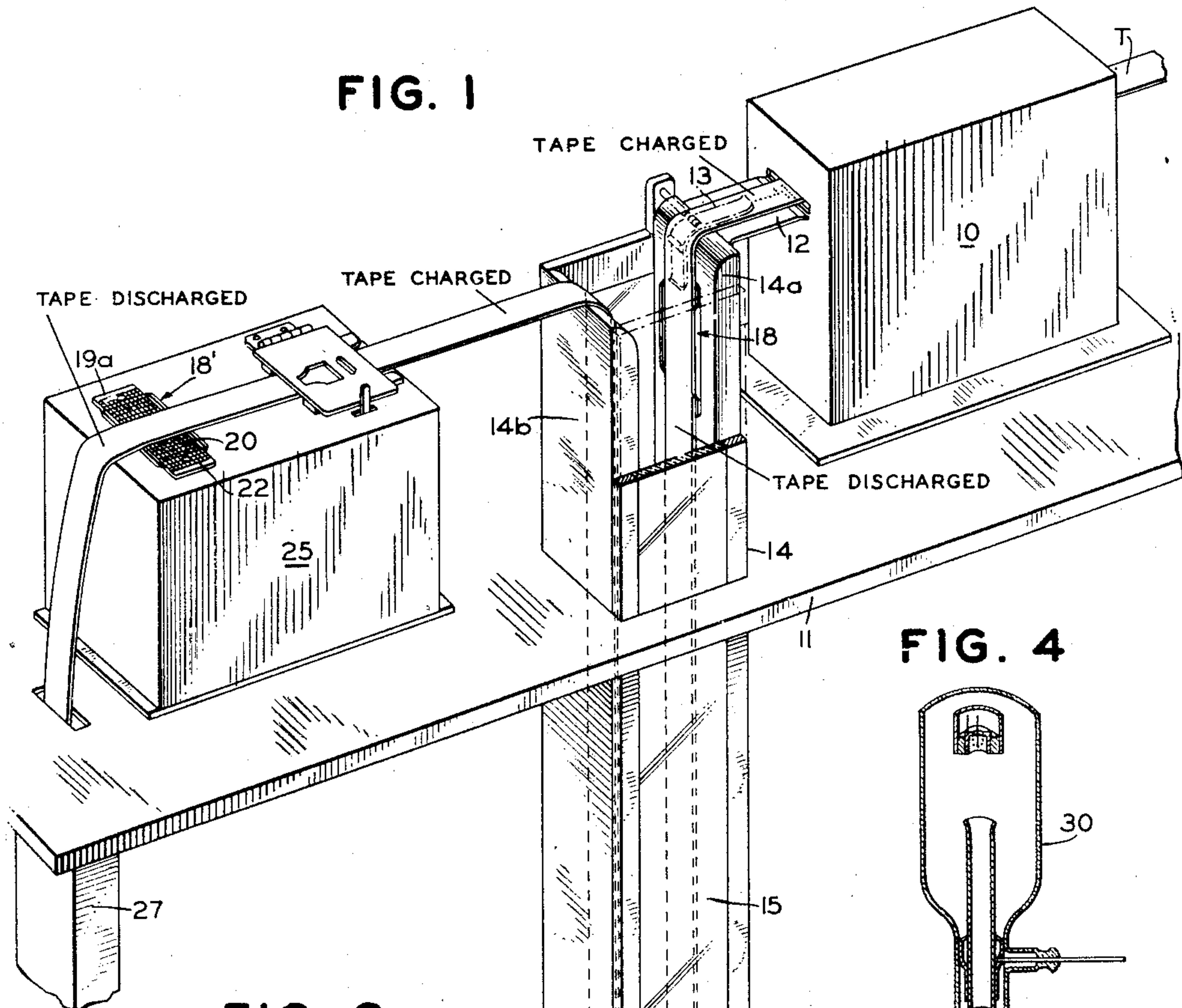


FIG. 2

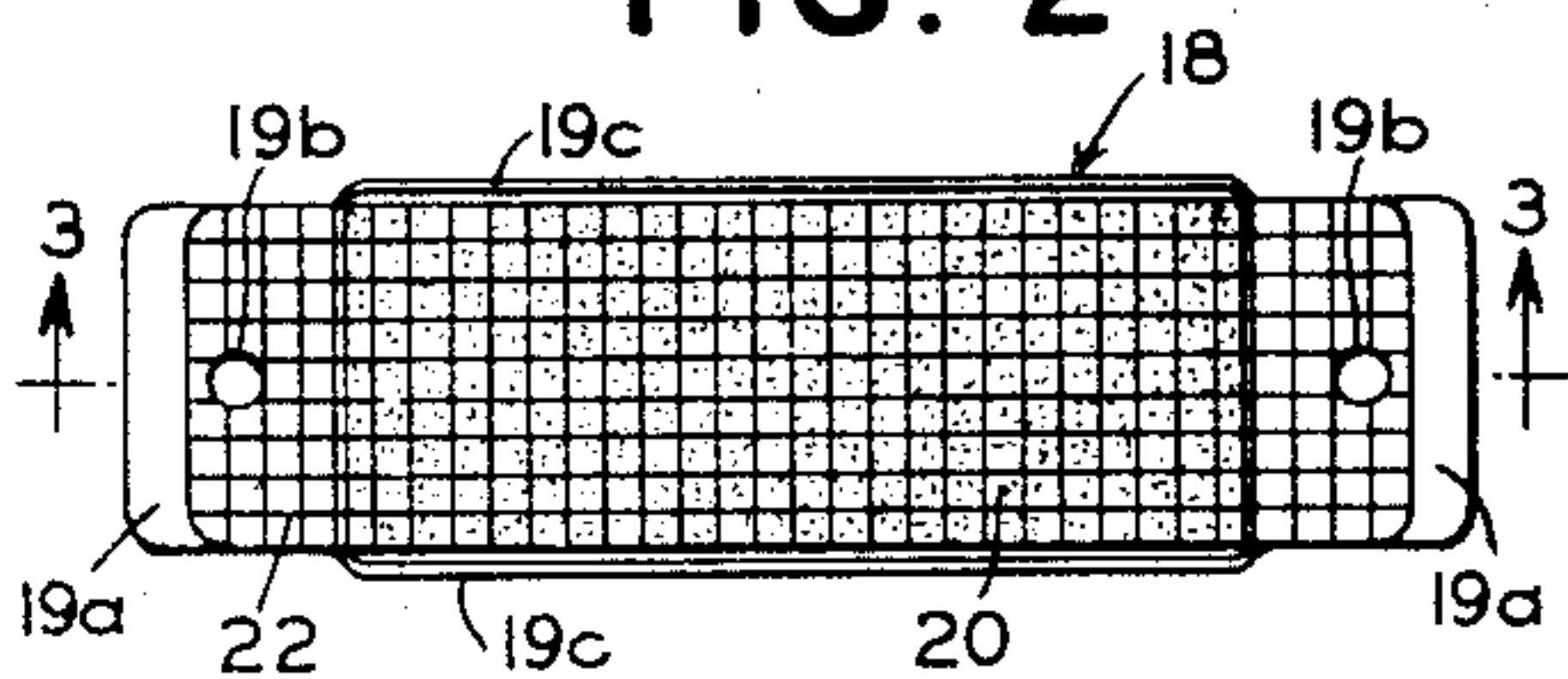


FIG. 3

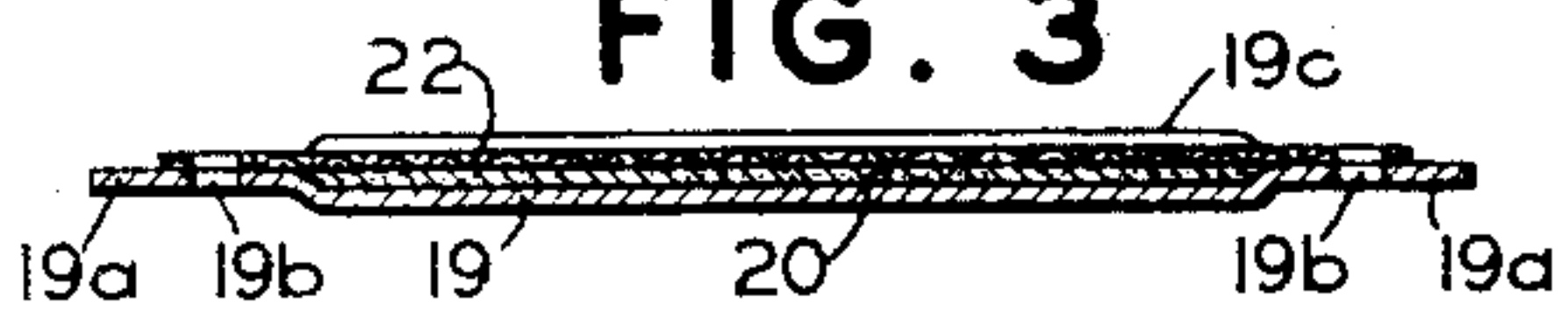
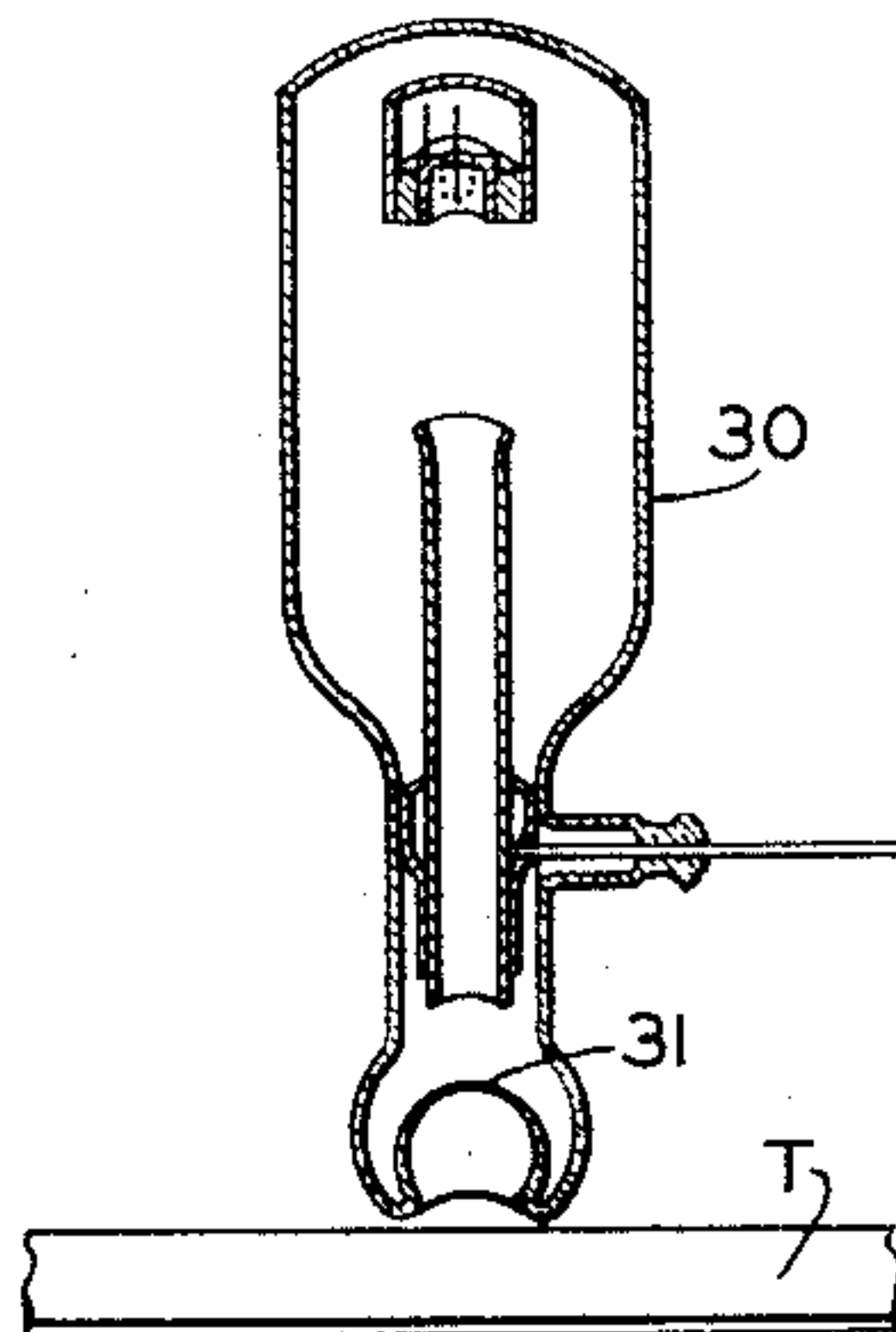


FIG. 4



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METHOD OF AND MEANS FOR NEUTRALIZING ELECTROSTATIC CHARGES ON MOVING TAPES AND THE LIKE

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8 Claims. (Cl. 178—42)

My invention relates to a method of and means for removing or neutralizing the electrostatic charges that accumulate on moving webs or tapes, and more particularly to neutralizing such charges on printer, ticker, perforator and similar tapes employed in telegraph receiving and transmitting apparatus.

In printing telegraph systems having a central office and a number of associated outlying branch offices or customers' offices, it has been found advantageous to provide a switching center for controlling the telegraph channels between the respective offices. At the switching center each incoming message is received on a tape perforator which punches successive rows of holes in a paper tape, the holes of each row being permuted in well known manner in accordance with the permutation code signals of the message received over the incoming channel. From the perforator the tape passes through a chute into an accumulator or storage compartment capable of holding a quantity of perforated tape containing messages which are awaiting retransmission. From the accumulator the tape again passes through the chute and into a tape transmitter which retransmits in permutation code, over an outgoing channel to the desired office, the messages stored in the perforated tape. After leaving the transmitter, the tape passes through another chute into a storage bin for "sent tape."

By reason of the friction between the moving tape and various parts of the perforator, tape chutes, accumulator, tape transmitter and other apparatus which the tape contacts during its travel, electrostatic charges are generated and accumulate on various portions of the tape. The charged tape is attracted to the surfaces over which it passes and tends to adhere to these surfaces, thus delaying or stopping the proper movement of the tape at these places, with the result that the tape piles up and becomes tangled, which disrupts the system. These electrostatic charges on the tape are especially troublesome when the surrounding air is dry and substantially non-conductive. Although various methods, including the use of grounded wires or brushes maintained in contact with the travelling tape, have heretofore been employed in an effort to remove or neutralize the electrostatic charges on the tape, none of these has proved practicable under varying service conditions.

An object of the invention is a suitable method of and means for removing or neutralizing the electrostatic charges that accumulate on moving tapes, belts and the like.

An additional object is to remove or neutralize electrostatic charges on a tape, without placing any drag or friction on the tape.

A more specific object is to neutralize electrostatic charges on printer, ticker, perforator and similar tapes used in telegraph receiving and transmitting apparatus.

Other objects and attendant advantages of the invention will be apparent from the following detailed description, taken in connection with the accompanying drawing, in which:

Fig. 1 shows a telegraph switching center having a receiving and retransmitting tape system embodying the features of the invention;

Fig. 2 is a plan view of one form of device which may be employed for neutralizing the electrostatic charges on the tape;

Fig. 3 is a longitudinal section taken along the line 3—3 of Fig. 2; and

Fig. 4 shows another form of the invention.

Referring to Fig. 1, there is shown a receiving perforator 10, mounted on a support 11, which receives the incoming telegraph signals and perforates a paper tape T in accordance therewith, the perforated tape issuing from the left hand side of the perforator as viewed in the figure. The tape passes over a guide plate 12 and under a tape guide 13, and thence over the upper end and down along one side 14a of a metal tape chute 14 that extends downwardly and opens into an accumulator chamber 16 in which the perforated tape is stored pending the retransmission of the messages punched in the tape. Preferably, and as shown, the front wall 15 of the tape chute is composed of glass or other transparent or translucent material in order that the condition of the tape within the chute may readily be observed, and for the same reason the front wall 17 of the accumulator preferably is composed of transparent material.

Due to the friction between the tape and various parts of the perforator 10, the tape as it issues from the perforator has an electrostatic charge thereon, as indicated by the legend "Tape charged" in Fig. 1. If not prevented, this charged portion of the tape would stick to the side 14a of the chute 14 and clog the tape chute. To obviate this, an electrostatic charge eliminator device 18 is secured to the upper end of the chute side 14a, the charged tape passing over the eliminator. As shown in detail in Figs. 2 and 3, the eliminator may comprise a shallow container or receptacle 19, preferably of aluminum, having end portions 19a for securing the container, as by screws that pass through openings 19b, to the

wall 14a of the tape chute. The receptacle contains a radioactive substance 20, such as one of the several known radium salts, preferably radium bromide, which is strong in alpha ray emanation.

Due principally to the ionizing power of the alpha rays emitted by the radioactive substance 20, the electrostatic charge on the tape is instantaneously neutralized or eliminated. Beta rays and gamma rays may also be emitted by the radioactive substance in an amount sufficient to appreciably increase the ionizing power of the substance 20 and thus also contribute to the discharge or neutralization of the electrostatic charge on the tape, although in general they are not as effective as the alpha rays.

The receptacle holding the radioactive substance is of sufficient depth to allow the substance 20, such as radium bromide, to be deposited by means of an evaporation process. The radioactive substance is protected from wear and mechanical injury by means of a mesh wire screen 22, preferably of aluminum wire. The screen is placed sufficiently close to the layer 20 to enable the tape to pass quite close to the radioactive substance thereby to subject the tape to the full ionizing power of the substance. The mesh screen may be secured to the container 19 by the turned-over edges 19a, the screen also having holes in the ends thereof to receive the fastening screws for securing the unit 18 in position. The container 19 may be located in any desired position with respect to the horizontal or vertical, but should be placed so that the tape passes directly over and in close proximity to the screen and substance 20.

After the tape passes over the electrostatic eliminator 18 on the chute side 14a, the charge is neutralized or dissipated, as is indicated by the legend "Tape discharged." The tape then passes down along the side 14a of the chute and into the accumulator 17 where a substantial length thereof may be contained in the accumulator, the tape then passing upwardly along the side 14b of the tape chute, and over the upper end of the chute, from whence it passes to the tape transmitter 25 for retransmission of the messages which were received by the perforator 10. The transmitter has feelers that are controlled by the transverse rows of holes in the tape, these feelers in turn controlling contacts for transmitting the signals stored in the tape. Due to the friction between the tape and the sides of the tape chute 14, and also due in some degree to the friction created by the folds of tape rubbing against each other in the accumulator 16, the tape again accumulates an electrostatic charge before it passes into the transmitter 25 as indicated by the legend. This electrostatic charge on the tape would, if not removed, cause the tape to adhere to the surface of the transmitter where the tape is discharged therefrom and thus cause the tape to pile up and prevent proper storage of the "sent tape." To prevent this, a second electrostatic charge eliminator 18' is located on the top of the transmitter 25. The construction of this eliminator is the same as eliminator 18, although for convenience the eliminator is positioned so that its longer dimension extends transversely of the tape. After passing the eliminator 18' the tape is discharged, as is indicated by the legend, so that it is free to pass through the discharge chute 27 and into a chamber or container (not shown), which holds the "sent tape."

Fig. 4 shows another form of the invention in

which an ionized gaseous zone is produced by the emanations from a cathode ray tube 30. The tube may be of any suitable construction such, for example, as disclosed in the Slack Patent No. 1,961,715, issued June 5, 1934, in which the cathode rays are emitted through a thin glass window 31. The tape T in its travel passes by the window and through the gaseous zone which is ionized by the tube 30, at which time the electrostatic charges on the tape are removed or neutralized. Any other method of producing a suitable ionized zone through which the tape is passed may, of course, be employed.

While the static charge eliminators have been shown as positioned at two places only in the tape system disclosed, it will be understood that they may be employed at any place in the system where the charge on the tape is likely to interfere with the proper movement of the tape. Since these eliminators apply no drag or friction to the tape, they may be used in any desired number and may have any suitable configuration other than that shown.

The invention has been shown with reference to one particular application thereof, but it will be understood that it may be employed for neutralizing electrostatic charges on various kinds of tapes and moving webs at places where the charges are apt to prove troublesome, and the invention is therefore not limited except as indicated by the scope of the appended claims.

I claim:

1. Telegraph apparatus comprising a telegraph signal device, a message signal control form coacting with said signal device, means including control form guide means for moving said control form relative to said signal device, said control form having the characteristic of accumulating electrostatic charges during movement of the form, the charged portions of the form tending to cause the form to stick to said guide means, and means for preventing the control form from sticking to the guide means comprising means for producing an ionized gaseous zone through which the control form passes for removing said electrostatic charges from the control form.

2. Telegraph apparatus comprising a telegraph signal device, a paper tape on which telegraph messages are stored, said tape coacting with said signal device, means including tape guide means for moving the tape relative to the signal device, said tape having the characteristic of accumulating electrostatic charges during movement of the tape, the charged portions of the tape tending to cause the tape to stick to said guide means, and means for preventing the tape from sticking to the guide means comprising means for producing an ionized gaseous zone through which the tape passes for removing said electrostatic charges from the tape.

3. Telegraph apparatus comprising a telegraph signal device, a tape on which telegraph messages are stored, a tape storage device, means including a tape chute for passing said tape between said signal and storage devices, said tape having the characteristic of accumulating electrostatic charges during movement of the tape, the charged portions of the tape tending to cause it to stick to said chute, and means for preventing the tape from sticking to the chute comprising means for producing an ionized gaseous zone through which the tape passes for removing the electrostatic charges from the tape.

4. Telegraph apparatus comprising a device for perforating a tape to store messages on the tape,

a tape storage device, means including a tape chute for passing the tape between the perforating apparatus and the tape storage device, said tape having the characteristic of accumulating electrostatic charges during movement of the tape, the charged portions of the tape tending to cause it to stick to said chute, and means for preventing the tape from sticking to the chute comprising means for producing an ionized gaseous zone through which the tape passes for removing the electrostatic charges from the tape.

5. Telegraph apparatus comprising a telegraph tape transmitter, a perforated tape on which messages are stored, a tape storage device, means including a tape chute for passing the tape between the transmitter and the storage device, said tape having the characteristic of accumulating electrostatic charges during movement of the tape, the charged portions of the tape tending to cause it to stick to said chute, and means for preventing the tape from sticking to the chute comprising means for producing an ionized gaseous zone through which the tape passes for removing the electrostatic charges from the tape.

6. Telegraph apparatus comprising a perforator for perforating a tape to store messages on the tape, a tape transmitter operable by the perforated tape for transmitting the messages thereon, means including tape guide means for passing the tape from the perforator to the transmitter, said tape having the characteristic of accumulating electrostatic charges during movement of the tape, the charged portions of the tape tending to cause it to stick to said guide means, and means for preventing the tape from sticking to the guide means comprising means for producing an ionized gaseous zone through which the tape passes between the perforator and

transmitter for removing the electrostatic charges from the tape.

7. Telegraph apparatus comprising a perforator for perforating a tape to store messages on the tape, an intermediate tape storage device for storing the perforated tape that issues from the perforator, means including tape guide means for passing the tape from the perforator to said intermediate storage device, said tape having the characteristic of accumulating electrostatic charges during movement of the tape, the charged portions of the tape tending to cause it to stick to the tape guide means, a tape transmitter, means for passing the perforated tape from the intermediate storage device to the transmitter for sending the messages on the tape, a sent tape storage device, means including other tape guide means for passing the tape from the transmitter to the sent tape storage device, and means for preventing the tape from sticking to the tape guide means comprising means for producing at least two ionized gaseous zones through which the tape passes for removing said electrostatic charges from the tape, certain of said ionized zones being positioned between the perforator and said intermediate storage device and another of said ionized zones being positioned between the transmitter and said sent tape storage device.

8. Means for removing or neutralizing electrostatic charges that accumulate on a moving tape, comprising a container positioned adjacent to the moving tape, means comprising a radioactive substance in said container for producing a zone of ionizing rays through which the tape passes, and means pervious to the passage of said ionizing rays and interposed between said radioactive substance and said tape to prevent the tape from contacting the radioactive substance.

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