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TAPE WINDING REEL

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FIG. 1

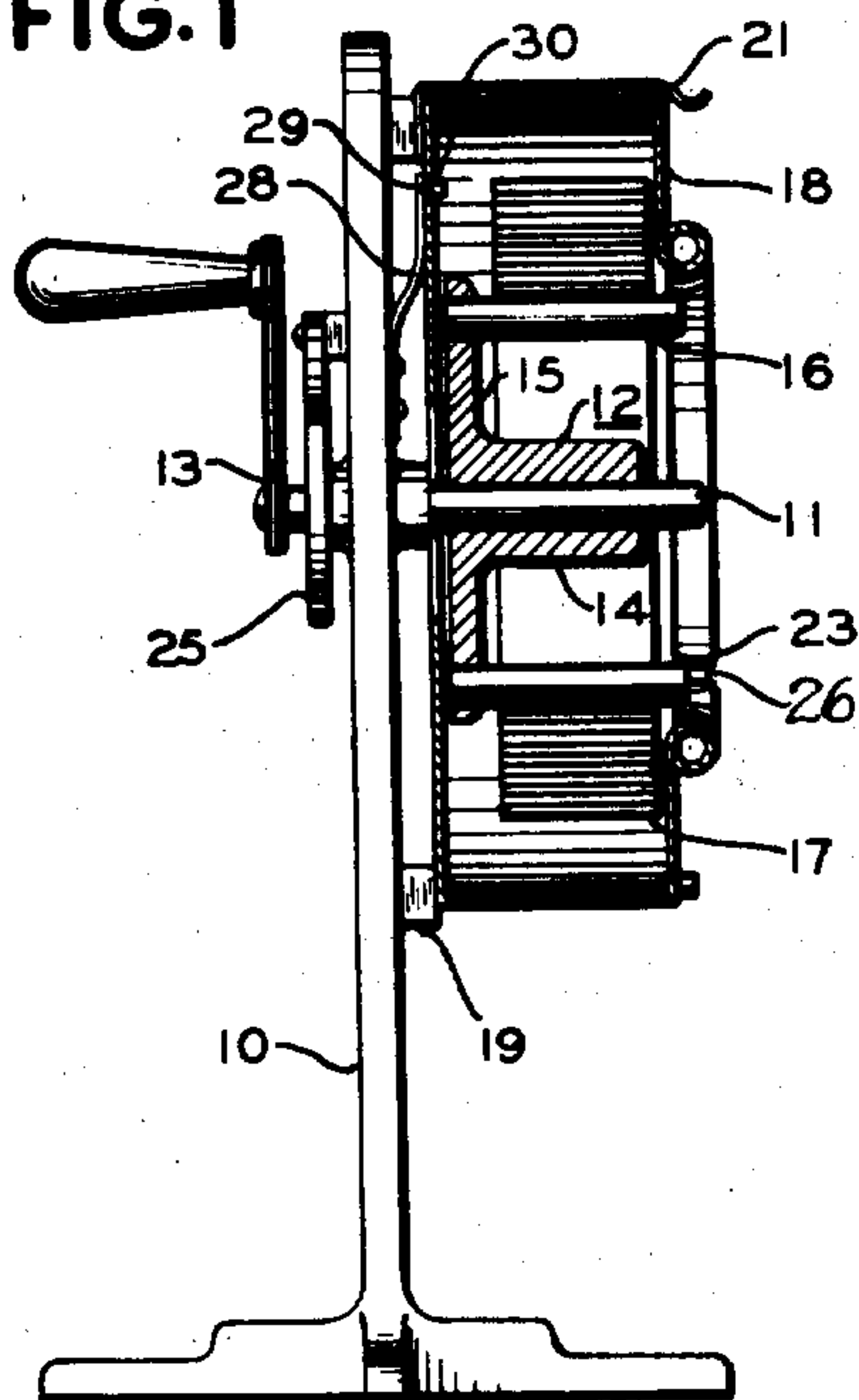


FIG. 2

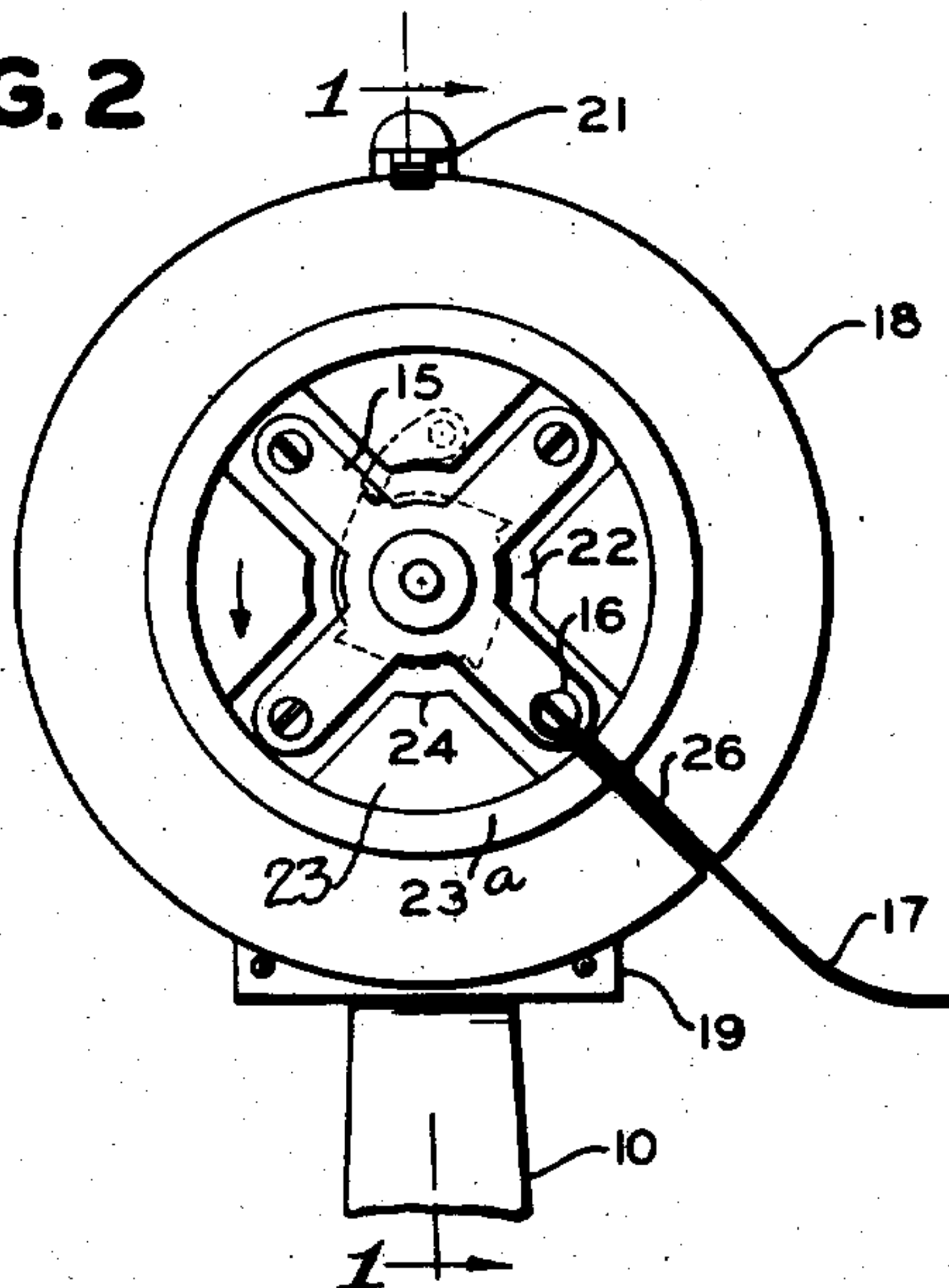


FIG. 3

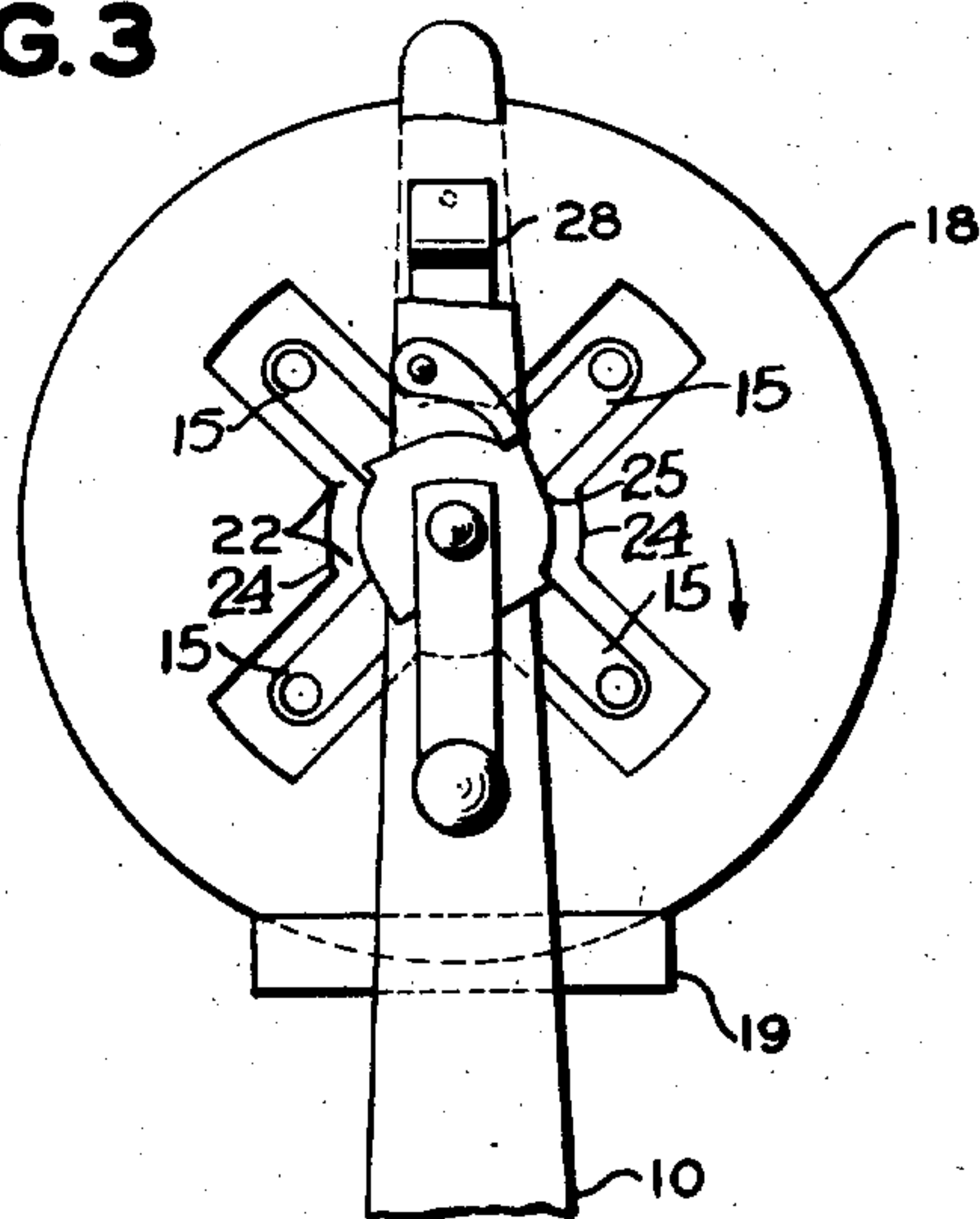


FIG. 4

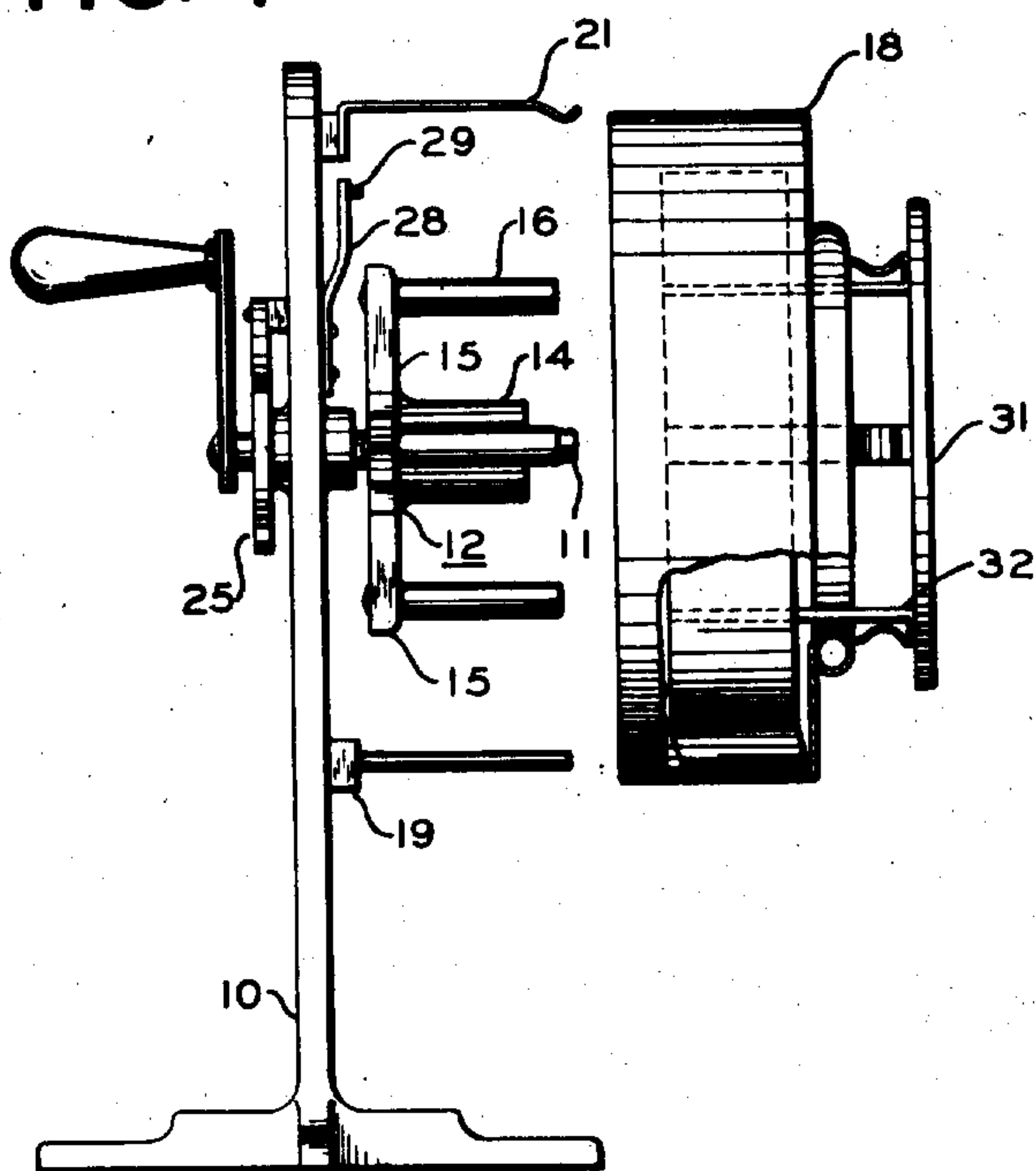
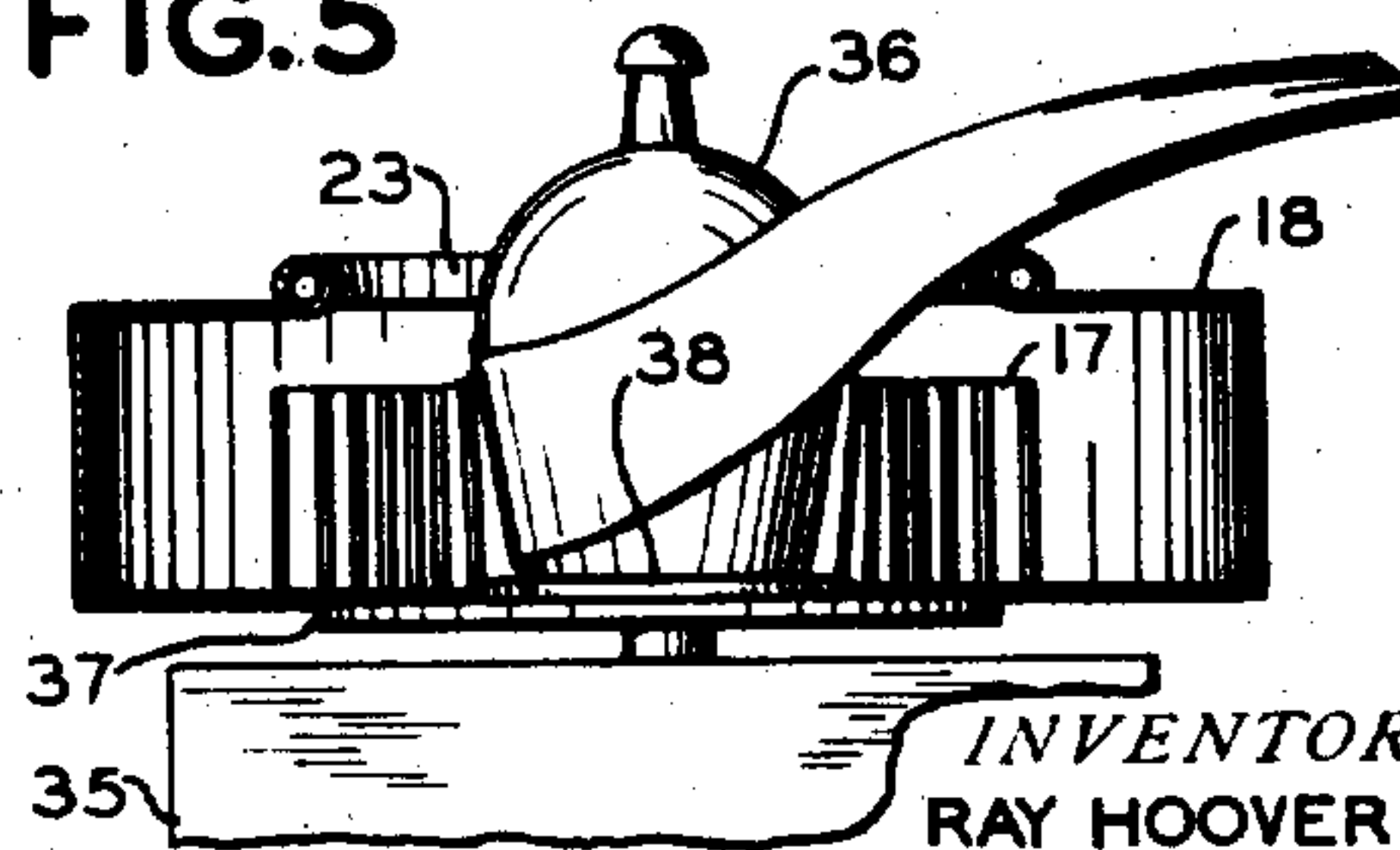


FIG. 5



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TAPE WINDING REEL

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9 Claims. (Cl. 242—70)

This invention relates to winding and reeling mechanisms, particularly to an arrangement for winding or forming a coil or reel of material within a container removably mounted about a reel, which container may be transported from the place of winding to some other place where it is desired to unwind the material.

The principal object of this invention is to provide means whereby material in the form of tape or other linear conformation can be wound on a reel encased in a container which may be removed from about the reel, said coil of material being removable simultaneously with the container and retained within container in wound form.

Another object of this invention is to provide container means for transporting coils of material in the form of tape or the like from a point of accumulation to another point at which it is desired to utilize the material.

A further object of this invention is to provide an arrangement for unwinding the reel or coil with the material traveling in the same direction as when it was wound upon the coil, that is, by withdrawing first from the coil the same end of the material which entered the coil at the beginning of the winding operation.

A still further object of this invention is to provide means to mount the container on a base or stand which will permit the material to be unwound freely from the coil without removing the coil bodily from the container.

Other objects of this invention will appear as the description proceeds.

While this invention may be applied to the handling and transporting of various types of material, it is particularly adaptable to handling material in the form of tape or thin flat strips. As a specific example, this invention may be employed in connection with the transporting of tapes employed in connection with telegraph apparatus in which a tape may be perforated or incoded by one telegraph machine situated in one location and decoded or employed to operate a transmitting machine situated at a distant location, in which case the perforated or coded tape is permitted to accumulate at the first machine until a certain message, a number of messages, or portions thereof, have been incoded on the tape when it is detached from the machine and transported bodily to the transmitting machine or point where it is to be decoded. In such a system of operation the problem arises of accumulating the tape in a form in which it can be easily transported and transporting the same

without damage and also of making the tape available at the point in which it is to be employed for decoding or retransmitting the message incoded thereon in such a manner that it may be permitted to unwind from the coil freely at the required speed.

According to this invention an arrangement is provided which will meet the above requirements for handling a tape under these conditions. According to the preferred embodiment of this invention a reel is mounted upon a stand with means for driving the reel to wind the tape as it accumulates from the perforating or incoding apparatus. A transportable container is mounted to form a circumferential enclosure about the reel providing a space within which a spiral coil or reel of the material may form about the fingers of the reel mechanism as it rotates. A slot or opening is provided in one side of the container for permitting the tape to enter the container and become wound about the fingers of the reel. The container is provided with suitable openings or recesses which permit it to be withdrawn laterally of the reel and it also includes suitable projections in the back side of the container which engage the coil of material and strip the same from the fingers of the reel as it is removed therefrom. A suitable cap is provided for covering an outer opening in the container. The cap has axially extending fingers which engage the coil of material and maintain the same substantially concentric in the container. When the cap has been put in place the container may then be transported readily by any suitable means to the location of the desired sending or decoding apparatus.

When it is desired to feed the material from the coil into the sending apparatus it will be observed that the material will necessarily be required to travel through the sending apparatus in the same direction as through the perforating or incoding apparatus. It will be observed also that when the coil is formed the forward end of the material is first wound upon the fingers of the reel and forms the center portion of the coil. When this coil of material now arrives at the unwinding position it is necessary to either rewind the coil of material in a reverse direction or to provide an arrangement for feeding the tape of material out of the coil so that the center portion of the coil is unwound first with the unwinding proceeding from the center outward. According to this invention it has been found that the rewinding step can be eliminated by providing a cone upon a suitable stand or base over which

the container is positioned, the cone entering the opening or core at the center of the coil of material and providing a stem around which the material will rise after the inner end has been

5 pulled sidewise from the center of the core and drawn forward around the stem or cone.

For a further description of this invention reference may be had to the accompanying drawing in which:

10 Fig. 1 is a view partly in section showing a reel rotatably mounted upon a stand and the container in position over the reel to receive the material as it is wound thereon;

Figs. 2 and 3 are front and rear elevations respectively of the arrangement illustrated in Fig. 1;

15 Fig. 4 is an expanded view of the apparatus illustrated in Figs. 1 to 3 with the container removed from the reel stand and the retaining cap in position to be placed on the container; and

20 Fig. 5 is a view illustrating the container mounted for unwinding the material therefrom.

Referring to Figs. 1 to 4 the preferred embodiment of this invention comprises a stand or support 10 carrying a shaft 11 upon which a reel 12 is rotatably mounted. A suitable crank 13 is secured to the shaft for driving the reel. It is to be understood that the reel may be driven by any suitable type of motor instead of the crank such as a spring motor provided with suitable means to connect it to the shaft or an electric motor suitably connected to the shaft and provided with proper control means. In such a case the stand 10 may be displaced by the frame or supporting members of the motor. The reel 12 comprises

30 a suitable hub 14 fitted to the shaft 11 and a plurality of arms 15 preferably four in number extending outward from the hub and carrying pins or fingers 16 secured in the outer end of the arms and arranged parallel to the shaft 11. Each of the fingers 16 is slotted in a radial direction so that the end of a tape such as the tape 17 may be inserted in the slot of any one of the fingers to hold the end of the tape at the beginning of the winding operation.

45 A cylindrical container or casing 18 is arranged to be mounted upon suitable supporting members 19 and 21 in a position concentric with the reel for forming a circumferential chamber about the reel which will enclose a coil of the tape 17 as it is wound upon the reel. The length of the container will be determined by the width of the tape material which it is desired to enclose. The ends of the cylindrical container are preferably formed of flat circular members. The rear end of the container is provided with an opening or recess 22 conforming somewhat to the star shape of the reel determined by the outwardly extending radial arms so that the container may be mounted in position over the reel by permitting the reel to pass through said opening

60 22 into the container. The forward end of the container embodies a circular opening 23 preferably of a diameter which will permit the outward end of the reel fingers 16 to extend into the opening when the container is mounted on the stand 10. The opening 23 is especially employed in connection with withdrawing or unwinding the tape from the reel as will be explained in more detail in connection with Fig. 5.

70 It will be observed that the star-shaped opening in the back portion of the container embodies segments 24 which extend inwardly out of the position of the fingers 16 sufficiently to reach beyond the inner edge of a coil or reel of tape wound

upon the fingers of the reel. The relation of these elements is best illustrated in Figs. 2 and 3.

It will be further observed that in placing the container in position over the reel it is necessary that the container be held in a definite position 5 with relation to the reel before it can be moved into proper position. In order to facilitate the positioning of the container with respect to the reel, suitable means for holding the reel in a predetermined fixed position is provided comprising 10 ratchet wheel 25 with an engaging pawl is arranged with the ratchet wheel fixed to the shaft 11 and the teeth in such position that when any one of them engages the pawl the arms of the reel will be in a definite angular position. In this 15 manner the casing can easily be positioned so that it slips readily into place over the arms of the reel.

When the container is slipped in place over the reel it envelops the reel so that it is necessary to provide an opening 26 in one side of the 20 container for admitting the tape or other material to be wound thereon. This opening is cut in the form of a slot entirely through the outer end or face of the container and along its circumference to the rear end. This arrangement enables 25 the end of the tape to be slid sidewise into proper place to feed through the container to the reel, and if in proper alignment with the slot embodied in one of the fingers 16 will pass simultaneously into position in said slot. 30

Usually the perforating machine or other source of the tape is disposed in a definite relation with respect to the position of the winding reel. It is, therefore, desirable that the slot 26 in the container shall be positioned nearest the source of 35 the tape. In order to provide for both of these features, means is embodied in the stand structure 10 to form a detent means so that the container may be rotated after it is placed upon the stand to a certain position when the detent will 40 engage a recess in the container and hold it in the desired position. This detent means may be provided by a spring 28 mounted on the stand embodying a pin 29 arranged to drop into a corresponding hole 30 in the container when the container is rotated so that the hole passes in front of the pin. When the container is first inserted in position the spring is pressed backwardly toward the stand maintaining the pin in engagement with the back of the container until it is 50 brought into retaining or detent position by rotating the container.

After the container has been located in the proper position the tape 17 to be reeled may be inserted through the slot 26 of the casing and 55 through a slot in one of the reel arms 16 and the end of the tape bent over or otherwise suitably secured in the slot. The reel may then be rotated in a counterclockwise direction looking at the front of the container until a coil of tape 60 has been formed about the fingers of the reel. As may be observed by referring to Fig. 1, this coil of tape will extend out into the circumferential chamber formed about the reel by the container 18. The coil of tape is removed from 65 the reel when the container is withdrawn from the support in a direction longitudinal of the shaft of the reel. The removal of the tape is accomplished by the back portion of the container and particularly the segments 24 of the back 70 portion coming into engagement with the coil of tape between the arms 15 of the reel.

As the container is withdrawn a cap 31 as illustrated in Fig. 4 to be snapped into place over the opening 23 is brought into position and the 75

fingers or arms 32 extending from the cap toward the container are inserted into the central opening in the reel of tape formerly occupied by the arms 16 of the reel. With the container entirely removed from the support and from about the reel and the cap 31 snapped into position, the fingers 32 will serve to keep the coil of tape substantially centered in the container and will effectively prevent the coil from falling out through the openings in either the front or rear end of the container. After the coil has thus been enclosed in the container it may be readily transported from one location to another without damage to the tape or without the likelihood of the coil becoming unwound or entangled.

After the tape has been transported to the desired destination it must then be unwound so that it may be fed into the decoding or transmitting machine. Ordinarily in order to feed the forward end of the tape first into the machine it would be necessary to rewind the coil of tape so that the forward end would appear at the outside of the coil. However, an arrangement similar to that illustrated in Fig. 5 eliminates the necessity for the rewinding operation and makes it possible to effectively unwind the forward end of the tape from the center of the coil in which position it appears the coil is first formed. The unwinding of a perforated tape which is weakened considerably due to the perforations therein, must occur very smoothly in order to eliminate any possibility of the tape hanging and causing rupture thereof. The mechanism illustrated in Fig. 5 has been found very effective and has already gone into extensive use.

The unwinding apparatus comprises a base 35 upon which a spindle 36 is rotatably mounted. At the bottom end of the spindle a disk 37 is secured upon which the container 18 rests when located on the unwinding mechanism. The inner ends of the segments 24 of the casing 18, as illustrated in Fig. 3, are circular and the largest diameter of the spindle 36 is of such dimension as to enable the spindle to pass through the opening in the back of the container embodied between the inner ends of the segments 24. The shape of the spindle 36 may be of other forms than that illustrated, as for instance a straight conical member in which the largest diameter is at the foot of the spindle. When the type of spindle illustrated is employed it is necessary to provide a centering plate 38 arranged to engage the inner ends of the segments 24. As illustrated the spindle 36 is provided with its largest diameter substantially at the upper edge of the coil of tape 17. From this point upward the surface of the spindle recedes toward the center. As shown in the illustration this surface is spherical but it may be either conical or any other shape which presents a receding surface. The purpose of the receding surface is to permit the inner end of the tape which is being withdrawn from the center of the coil to ride upon the spindle and easily slip upwardly as it approaches the rim of the opening 23 at the top of the container. The opening 23 is of a substantially larger diameter than the largest diameter of the spindle in order to provide an annular opening through which the tape may easily pass. As the inner end of the tape rises to pass over the rim 23a of the opening 23 there is a tendency for the tape to twist at the point where it begins to rise from the inner portion of the coil. If the coil is loosely wound the tape being withdrawn may readily rise from the

center of the coil when a substantially conical spindle having its largest diameter at its lower end is employed. On the other hand, if the coil of tape becomes tightly wound the tendency of the tape to twist as aforesaid will cause binding between the inner side of the coil of tape and the spindle as it tends to rise. It has been found that by undercutting or tapering the portion of the spindle extending through the coil of tape, to provide room for the rising portion of the tape to twist, as it has a tendency to do, the possibility of the tape binding if the coil is wound tightly is practically eliminated.

In the unwinding operation as above described the spindle 36 performs several functions. The first of these is to keep the coil of tape centered in the container so that it will properly feed out through the opening 23 in the top of the container. The second of these functions is to provide a member on which the tape can ride or roll as it is pulled outward through the opening 23. Another function is to prevent the coil of tape or other material, in case the mechanism is applied to material other than tape, from collapsing as the thickness of the coil is reduced. Still another function of the spindle 36, particularly, when it is provided with a surface decidedly receding toward the center such as the spherical form illustrated, is to permit the tape to be twisted substantially into the horizontal plane with the outer surface of the coil convolutions uppermost, permitting the tape to be withdrawn in a substantially radial or horizontal direction. This twist is clearly pictured in Fig. 5 of the drawing. When the tape is withdrawn from the coil in this manner no difficulty is experienced in the tape tending to bind upon the inner convolutions of the coil. The unwinding of the coil proceeds with a smooth and free movement.

From the foregoing description it will be seen that a method and apparatus is provided for winding a coil of tape within a container which may be transported from place to place and furnish protection to the tape during the time of transport, and also when the tape has reached its destination and it is desired to unwind the same with the same end traveling foremost as when wound it may be accomplished by unwinding the tape from the center outwardly without any intermediate rewinding step or the removal of the coil bodily from the container. This is especially advantageous in connection with tapes which are encoded or perforated with a message or telegram thereon and which arrives in a central or exchange office over a machine in one part of the building and is retransmitted over another machine located in another part of the building requiring that the tape be transported bodily from the one to the other.

While this invention has been described primarily in connection with winding coils of tape it may be employed to wind coils of other materials in a suitable container for transporting the same. In such cases the structure may be suitably modified to admit the type of material to be wound thereon.

While this invention has been illustrated and described in but one form it will be apparent to those skilled in the art that it is not so limited but is subject to various changes and modifications without departing from the spirit thereof, and it is desired therefore that only such limitations shall be placed thereon as are imposed by the prior art, or as set forth in the appended claims.

What I claim is:

1. In a winding mechanism, the combination of a support, a reel rotatably mounted on said support, a casing removably secured to said support and arranged to form a circumferential enclosure about said reel, said casing being provided with an opening for admitting material to be wound upon the reel, means to drive said reel for winding a coil of material thereon, and means provided on said casing for withdrawing the material from the reel in coiled form as the casing is removed from the support.
2. In a winding mechanism, the combination of a support, a reel rotatably mounted on said support, said reel embodying radial arms carrying winding fingers, means removably secured to said support and arranged to form a circumferential container about said reel, said container being provided with an opening for admitting material to be wound upon the reel, means to drive said reel for winding a coil of the material thereon, said container being removable from about the reel by withdrawing the same axially of the reel, and means provided on said container for withdrawing the material from the reel in wound form as the container is removed from the support.
3. In a winding mechanism, the combination of a support including a shaft rotatably mounted therein and means to rotate the shaft, a reel secured to the shaft, said reel comprising radially extending legs forming a spider and axially extending fingers secured to the outer ends of said spider legs, a casing arranged to form a circumferential container about the legs and fingers of said reel, means to removably secure said casing to the support in position to permit the reel to be rotated internally of the casing, said supporting means providing for withdrawing the casing longitudinally of the axis of the reel, the rear wall of said casing being provided with an opening conforming substantially to the shape of said spider and embodying projections extending down between the spider legs of the reel in position to engage a coil of material formed upon the fingers of the reel and withdraw the same longitudinally of the axis of the reel as the casing is removed.
4. The combination of a support and a reel rotatably mounted thereon, a casing with front and rear walls arranged to be removably mounted concentrically over said reel for forming a circumferential chamber about said reel embodying space for a coil of material to be wound upon said reel and contained within said chamber, said casing being provided with a circular opening in one of said walls, a cover arranged to be secured in place over said opening, and fingers mounted upon said cover and arranged to project into the center of the coil of material when the container is removed from its position about the reel.
5. In a winding mechanism, the combination of a support, a reel rotatably mounted thereon, a casing arranged to be removably mounted on said support in a position concentrically about said reel, said casing having front and rear walls, said rear wall being provided with an opening of suitable conformation to pass over the reel as the container is placed upon the support, means provided on the support for holding the container in a definite transverse position with respect to the reel, and detent means secured to the support and arranged to engage the casing for holding

the same in a definite angular position with respect to the reel.

6. In a system for handling coils of spirally wound tape, the combination of a transportable container with a first device for forming a coil of tape within said container and a second device for unwinding said coil from the center outwardly, said first device comprising a reel, means for removably supporting said container about said reel in position to enclose a coil wound upon said reel, said container being provided with means for admitting a strip of tape to be wound upon the reel and means for withdrawing the tape in coil form after being wound and for retaining the same in transportable condition after it has been removed from said reel, said second device being independent of the first device and comprising a support upon which said container may be mounted on a rotatable spindle arranged to protrude through the center of the container and coil of tape to form a guide for the inner convolutions of the tape, so that it may be unwound by withdrawing the inner end from said coil against said spindle.

7. In a system for transporting tape, the combination of a transportable drum having openings provided in its heads, with a first device arranged to form a coil of tape within said drum with the forward end of the tape at the center of the coil, and a second device arranged to support said drum and provided for unwinding said coil with the forward end foremost without removing the same from said drum, said first device comprising a reel arranged to be disposed within said drum for its winding operation, means for removably supporting said drum about said reel in position to enclose a coil of tape wound thereupon, said drum being provided with a slot in its body parallel to the axis of the reel for admitting a strip of tape to the reel, and means upon the container for withdrawing the tape in coil form after it has been wound upon the reel and retaining the same within said drum as it is removed from about said reel, said second device being independent of the first device and comprising a support embodying a base upon which one head of the drum may rest when supported thereon, and a rotatable spindle having a receding upper surface arranged to protrude through the openings in the heads of said drum and coil of tape to form a guide for the inner convolutions of the tape so that it may be unwound by grasping the forward end of the tape at the innermost convolution and withdrawing the tape from said coil against said spindle with a twist in the tape which brings the inner surface thereof against said upper receding spindle surface.

8. In apparatus for handling tape and the like a transportable container having front, rear and side walls, said container being adapted to enclose a coil of tape and retain the same as the container is transported from place to place, said front and side walls embodying adjoining slots for inserting the end of the tape for forming a coil within the container, said front wall also embodying a circular opening for permitting the tape to be unwound from the coil from the center outwardly with the container in any radial angular position with respect to the strip of tape as it leaves the same.

9. In apparatus for handling coils of spirally wound tape and the like, a cylindrical transportable container having front and rear walls,

said rear wall being adapted to admit mechanism for drawing tape into the container and winding the same in coil form, the peripheral wall of said container embodying a slot for admitting
5 the tape to be wound upon the coil, the front wall of said container embodying a circular opening for permitting the coil to be unwound from the center outwardly in any radial direction from

the container, the slot of the peripheral wall being extended through the front wall to the central circular opening so that the tape may be grasped at its forward end and inserted through the central opening into position in said
5 winding mechanism and said peripheral slot without releasing the same.

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