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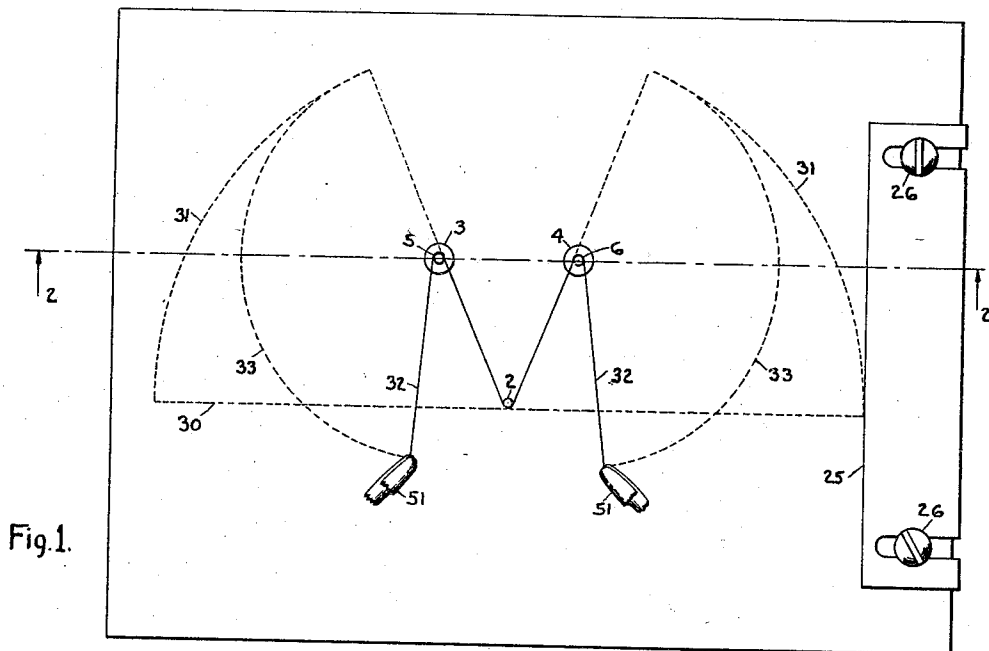
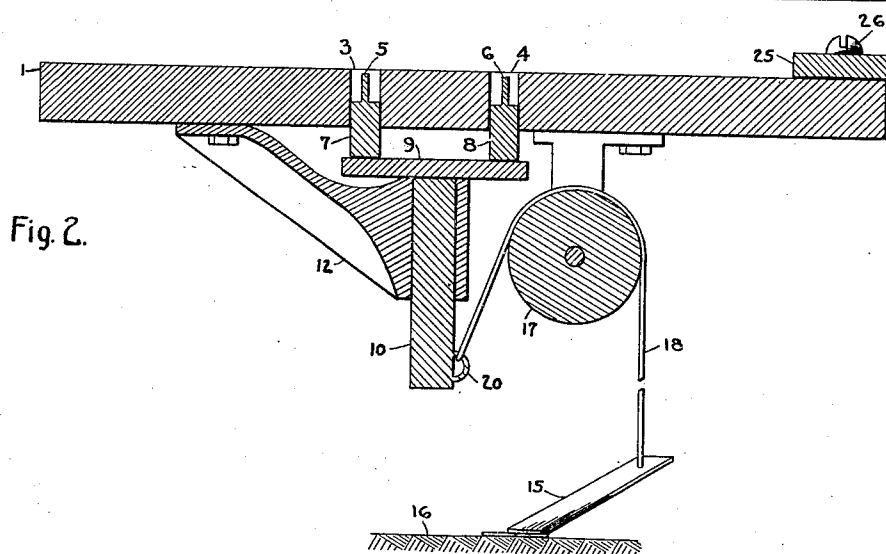
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VACUUM TUBE APPARATUS

Filed Dec. 7, 1929

2 Sheets-Sheet 1



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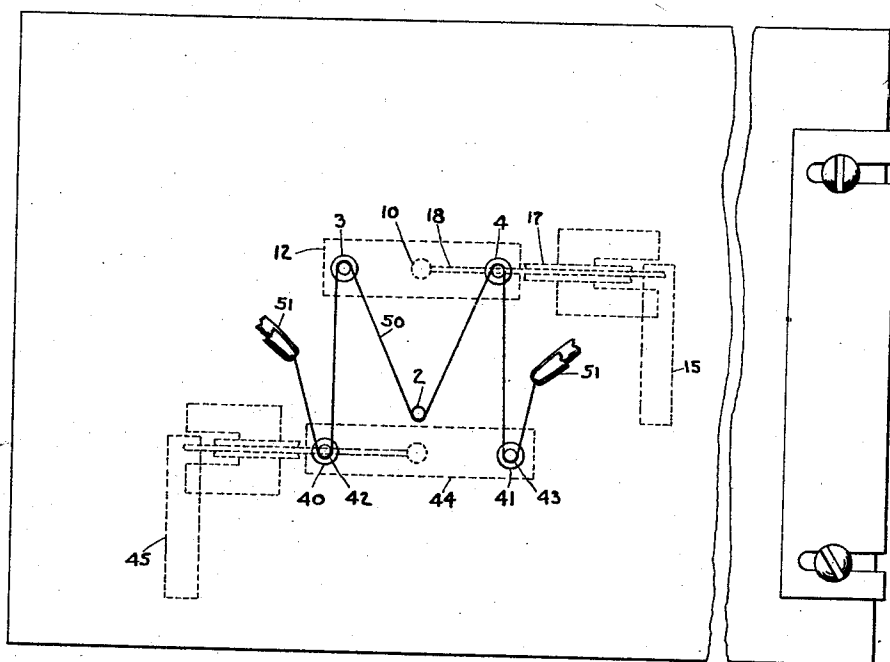


Fig. 3.

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VACUUM TUBE APPARATUS

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This invention relates to an apparatus for and method of shaping filamentary bodies such as cathodes of electron discharge devices. In devices of this character it is customary to have a cathode bent into a zigzag shape such as an M. Generally such cathodes comprise a thin ribbon of metal, as nickel, or the like, coated with chemicals tending to promote the emission of electrons upon the heating of the filament. This coating is delicate and frail and makes the problem of shaping the cathodes difficult. Furthermore, due to the small clearance between electrodes, it is necessary that the cathodes be formed with accuracy and without substantial stretching tending to tear or flake off the coating.

An object of this invention is to devise a simple method for suitably shaping cathodes, involving a minimum amount of handling and bending of the cathode. A further object is to devise simple and cheap apparatus for carrying out this method.

In general, the method consists of holding a predetermined length of filament at the ends thereof and disposing it against a pin or stop so that the latter will come at an intermediate portion of the filament, in this particular instance, the center. The ends of the filament are then bent around on the pin as a center or fulcrum, thus forming a loop. Upon the filament sweeping past certain predetermined positions, movable stops or pins are caused to appear and function as new fulcrums around which the filament is to be bent. As many pins as desired may be caused to successively appear subsequent to the formation of loops in the filament. The advantage of this method lies in the fact that the filamentary strips may be bent around any one or more of the stops in a plane substantially perpendicular to the pins, thereby avoiding twisting of the ribbon.

Referring to the drawings,
Fig. 1 is a plan view of an apparatus used in shaping filaments;

Fig. 2 is a section on 2—2 of Fig. 1;

Fig. 3 is a plan view of a modification.

The apparatus in general comprises a base plate 1, preferably of metal, supported in any

desired manner on a work bench (not shown). A centering stop or pin 2 is secured in the central portion of plate 1 in any suitable manner. Above pin 2 and symmetrically disposed with respect thereto are two apertures 3 and 4 formed in plate 1. Movably mounted in said apertures are stops or pins 5 and 6 extending upwardly from two cylindrical members 7 and 8. These latter members are adapted to snugly fit apertures 3 and 4 and to slide up and down therein. The mechanism for operating members 7 and 8 may consist of any simple means such as a yoke 9 permanently fastened in any suitable manner to the bottoms of members 7 and 8. Yoke 9 is adapted to be actuated by a sliding member 10 permanently connected thereto in any suitable manner. Slider 10 is suitably maintained by a supporting journal 12 fastened to plate 1. A treadle 15 with one end fixed to the floor 16 is adapted to operate the mechanism by means of a chain or cable 18 passing over a roller 17 suitably mounted to table 1 and engaging a hook 20 in slider 10.

It is clear that by operating treadle 15 slider 10 will be moved upwardly, causing pins 5 and 6 to rise above the level of table 1. Cylindrical portions 7 and 8 below the pins are preferably of a length equal to the thickness of table 1 so that portions 7 and 8 will not rise above the level of the table. Upon the release of the treadle the weight of the parts will suffice to drop the pins into the position shown in Fig. 2. A gauge 25 adjustably mounted by screws 26 is provided for determining an end of the filament thus positioning the filament with respect to stop or pin 2.

In order to shape a filament, a straight portion 50 of predetermined length is laid on table 1 so that it occupies the position shown by dotted line 30. Obviously, in this instance, gauge 25 should be so adjusted with respect to pin 2 that the distance therebetween is half the length of a filament, although any desired distance may be chosen. In practice, the filament is held by the points of two tweezers 51 grasped by an operator. With the apparatus in the position shown in Fig. 2, the free ends of the filament are bent around

pin 2 as a center to form arcs 31 of a circle. The two halves of the filament are bent beyond apertures 3 and 4. The operator then depresses treadle 15, causing pins 5 and 6 to project above table 1. At the same time ends 32 of the filament are bent around pins 5 and 6 as centers, describing arcs 33.

In Fig. 3 an apparatus is shown in which filaments having a larger number of loops may be shaped. This has all the elements of the apparatus shown in Figure 1 and in addition thereto has apertures 40 and 41 in which pins 42 and 43 may slide. The mechanism for this may consist of a yoke 44 suitably operated by a treadle 45 similar to that shown in Fig. 2.

Obviously, the filament in this case is first shaped in the same manner as shown in Fig. 1, with the further addition that pins 42 and 43 are caused to appear after the ends of the filament sweep by. The free ends may then be bent back as shown. Additional pins 42 and 43 may be disposed in any desired relationship to pin 2 or movable pins 5 and 6, thus resulting in any desired preformation of the filament.

It is evident that more pins may be added with additional operating mechanism so that any successive number of loops may be formed in the filament. Furthermore, instead of the pins coming up from the table, they may be arranged to drop from above.

What I claim is:

1. The method of shaping a filament which consists in disposing a predetermined length thereof against a stop bearing at an intermediate portion of said filament, bending the free ends of said filament toward each other around said stop, disposing additional stops in the path of predetermined portions of said filament after said portions have been bent toward each other, and then bending the free ends of said filament toward each other around said additional stops.

2. The method of shaping a filament which consists in disposing a predetermined length thereof against a stop bearing at an intermediate portion of said filament, bending the free ends toward each other around said stop, disposing additional stops in the paths of predetermined portions of the filament after said portions have been bent toward each other, bending the free ends of said filament toward each other around said additional stops and continuing the disposition of additional stops and bending of the ends of said filament.

3. An apparatus for shaping filaments comprising a stop, and a gauge mounted at a predetermined distance from said stop and determining the position of an end of the filament, said filament adapted to have an intermediate portion thereof bear against said stop and around which the ends thereof are to be bent toward each other, additional

stops, and means for causing said additional stops to come into operative relationship with predetermined portions of said filament and around which the ends thereof are adapted to be bent.

4. An apparatus for shaping filaments comprising a fixed stop against which an intermediate portion of a filament is adapted to bear and around which the ends thereof are to be bent toward each other, a gauge disposed at a predetermined distance from said fixed stop and determining the position of an end of said filament, a plurality of additional stops, means for causing certain of said stops to come into operative relationship with predetermined portions of said filament and around which the ends of said filament are to be bent, and additional means for causing other stops to come into operative relationship with different predetermined portions of said filament and around which the ends of said filament are adapted to be bent.

5. An apparatus for shaping filaments comprising a table having a stop projecting above the surface of the table, a plurality of additional stops disposed below the surface of said table, and means for causing said additional stops to appear above said table.

6. An apparatus for shaping filaments comprising a table, a stop projecting above the surface of said table, a gauge disposed at a predetermined distance from said stop, additional stops disposed below the level of said table and selective means for causing said additional stops to appear above the table.

7. An apparatus for shaping filaments comprising a table having a pin projecting above the surface thereof, said table having a plurality of apertures therein, pins disposed in said apertures and means for causing said pins to rise in said apertures above the level of said table.

8. An apparatus for shaping filaments comprising a table having a stop projecting above the surface thereof, and provided with a plurality of apertures therein, a gauge at a predetermined distance from said stop, pins disposed in said apertures, and means for causing said pins to move in said apertures whereby said pins may appear above the surface of said table.

9. An apparatus for shaping filaments comprising a table, a plurality of stops projecting therefrom and around which the ends of a filament are adapted to be bent, means for causing certain of said stops to be positioned below the level of the table and an adjustable gauge for determining the end of said filament.

In testimony whereof he hereunto affixes his signature.

ARTHUR R. PERRY.

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