Nov. 16, 1948. L. E. PAMPHILON 2,454,003

TAPE SLITTING MACHINE

Filed Aug. 26, 1946 3 Sheets-Sheet 1

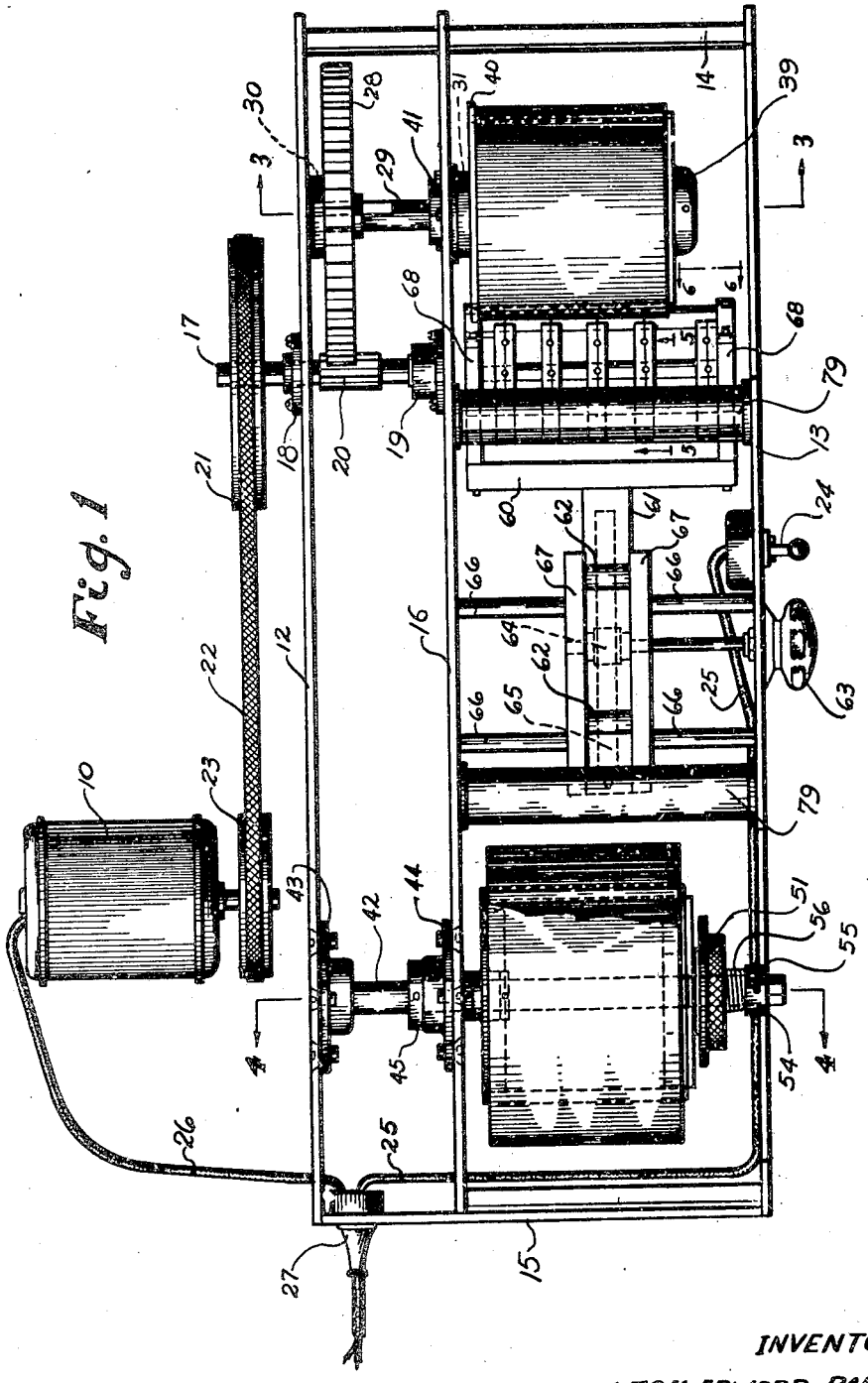


Fig. 1

INVENTOR.
LEON EDWARD PAMPHILON
BY Hyde W. Ballard
ATTORNEY

Nov. 16, 1948. L. E. PAMPHILON 2,454,003

TAPE SLITTING MACHINE

Filed Aug. 26, 1946 3 Sheets-Sheet 2

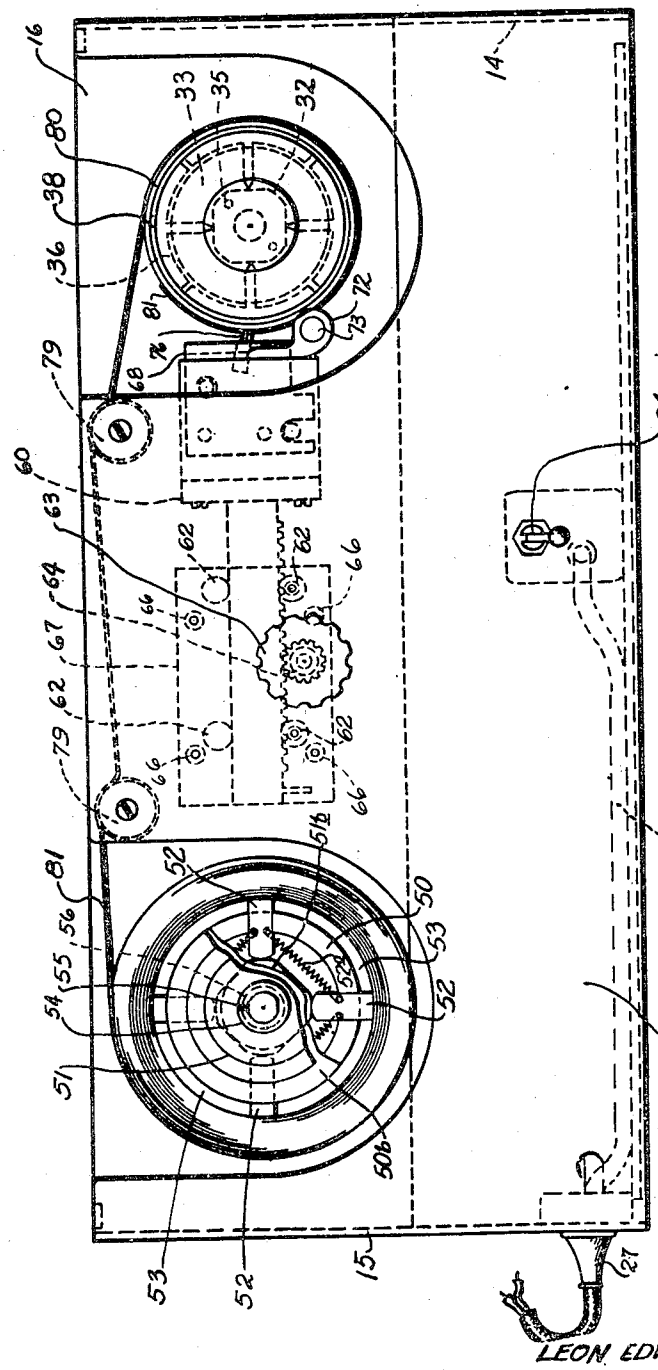


Fig. 2

INVENTOR.
LEON EDWARD PAMPHILON

BY

Hyde W. Ballard

ATTORNEY

Nov. 16, 1948. L. E. PAMPHILON 2,454,003

TAPE SLITTING MACHINE

Filed Aug. 26, 1946 3 Sheets-Sheet 3

Fig. 3

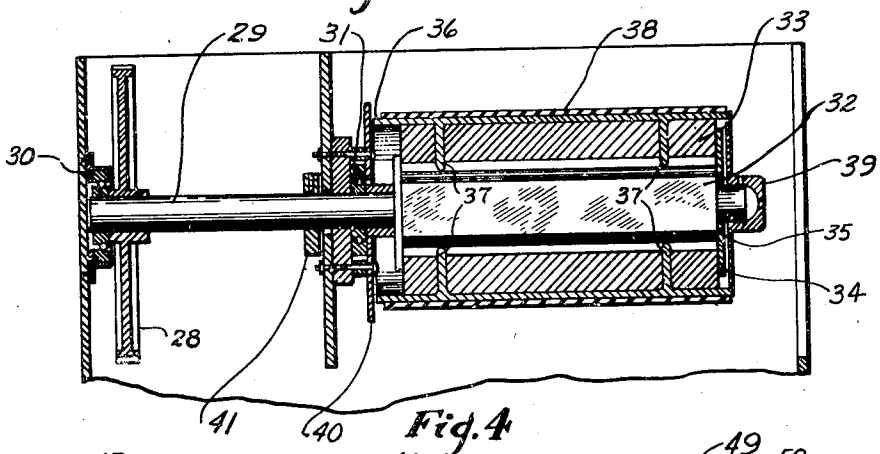


Fig. 4

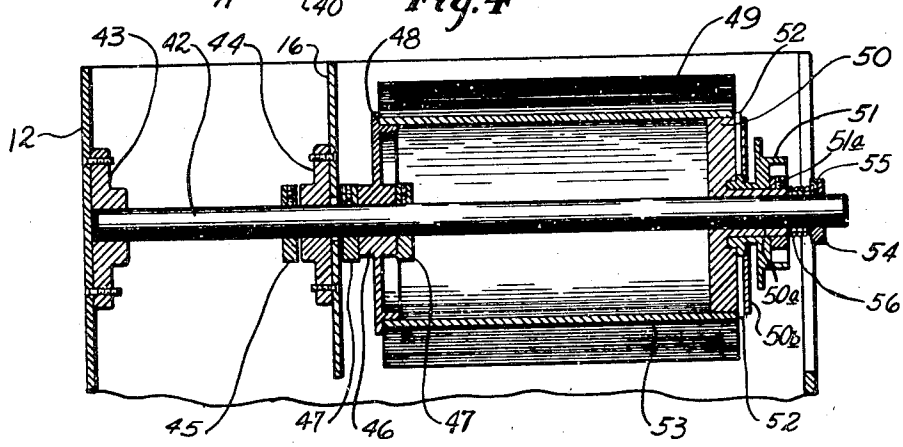


Fig. 5

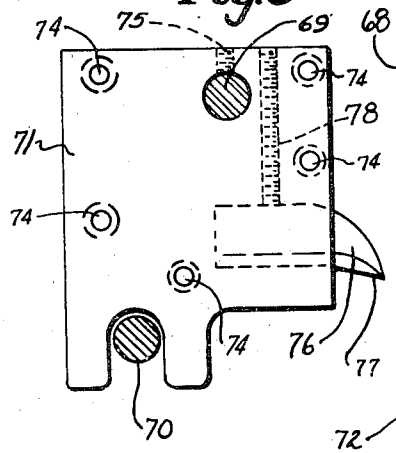
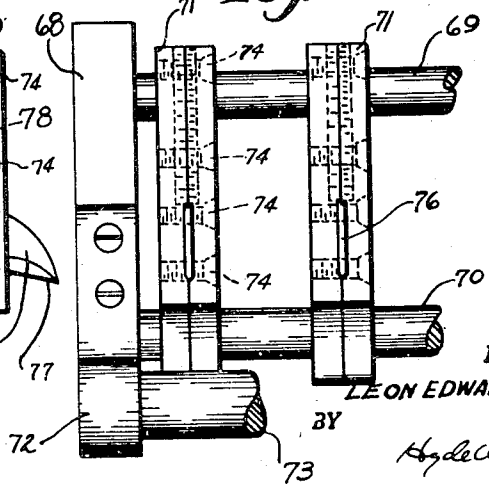


Fig. 6



INVENTOR.
LEON EDWARD PAMPHILON
BY
Hyde W. Ballard
ATTORNEY

Patented Nov. 16, 1948 2,454,003

UNITED STATES PATENT OFFICE

2,454,003

TAPE SLITTING MACHINE

Leon Edward Pamphilon, Yeadon, Pa., assignor to Airdesign, Incorporated, Upper Darby, Pa., a corporation of Pennsylvania

Application August 26, 1946, Serial No. 692,975

8 Claims. (Cl. 164—39)

1

My invention relates to devices for slitting flat material and more particularly to machines for cutting a roll of tape into a plurality of rolls of smaller width.

I have found that in the manufacture of small electrical resistors, transformers, and condensers the insulating material which is ordinarily a gummed tape must be of an extremely accurate width, and in addition it must be possible to vary the width of the insulating material in accordance with the particular size of the device in which it may be incorporated.

An object of my invention, therefore, is to provide an apparatus for quickly and accurately cutting a roll of adhesive tape into any desired number of narrower rolls.

A further object of my invention is to provide apparatus in accordance with the above object which is capable of extremely accurate adjustment with respect to the width of the rolls to be formed.

A further object of my invention is to provide an automatic take-up device in a tape slitting machine whereby slipping of the roll on the take-up mandrel is eliminated.

A further object is the provision of an automatically fed cutting bar having a friction controlled feed.

A further object is to provide a cutting bar containing a plurality of cutting knives adapted for quick adjustment.

Further objects will be apparent from the specification and drawings, in which:

Fig. 1 is a plan view of my tape slitting machine;

Fig. 2 is a front elevation of the construction of Fig. 1;

Fig. 3 is a fragmentary section taken along lines 3—3 of Fig. 1;

Fig. 4 is a fragmentary section taken along lines 4—4 of Fig. 1;

Fig. 5 is an enlarged detail of a knife holder as seen from line 5—5 of Fig. 1; and

Fig. 6 is an enlarged fragmentary detail of the knife holders as seen from 6—6 of Fig. 1.

Like reference characters denote like parts in the several figures of the drawings.

While certain novel features of the invention are disclosed herein with considerable detail with respect to certain particular forms of the invention, it is not desired to be limited to such details since many changes and modifications may well be made without departure from the spirit of the invention in its broadest aspect.

Referring now more particularly to the drawings, the various elements of my cutter with the exception of electric motor 10 are shown mounted in a generally rectangular housing 11 having sides 12 and 13 and ends 14 and 15. Partition 16 located lengthwise of housing 11 extends substantially halfway down from the top of ends 14 and 15 and is secured thereto. Shaft 17 is supported on side 12 and partition 16 by means of bearings 18 and 19. Shaft 17 carries gear 20 located between side 12 and partition 16 and pulley 21 shown exteriorly of side 20. Pulley 21 is driven by electric motor 10 through belt 22 and pulley 23 in the usual manner. Electric motor 10 is controlled by toggle switch 24 and lines 25 and 26, which are connected to an outside source of current through plug 27.

2

Gear 20 drives mating gear 28 on shaft 29 which is journaled in bearings 30 and 31 anchored on side 12 and partition 16 respectively. Shaft 29 extends through partition 16 as shown in Fig. 3 and supports shank 32 which is fabricated of square stock having the corners of the square rounded as shown in Fig. 2. Collar 33 is rotatably mounted on shank 32 upon which it is held in place by plate 34 and screws 35. Enclosing collar 33, are four segments 36 having pins 37 extending through collar 33 to contact the square sides of shank 32. Segments 36 are retained radially by rubber sleeve 38 and the entire end of the assembly is enclosed by cap 39 keyed to shaft 29. Plate 40 attached to bearing 31 acts as a stop for cylinders to be inserted over rubber sleeve 38 in a manner to be described hereinafter. Collar 41 on shaft 29 is adjusted to prevent undesirable end play of the shaft 29.

The feed mandrel assembly is supported on shaft 42 journaled in bearings 43 and 44 on side 12 and partition 16 respectively. Shaft 42 likewise has a collar 45 for elimination of excessive end play, and carries a flange 46 adjustably mounted on the shaft by means of collars 47. Flange 46 has a shoulder 48 adapted to receive a roll of tape 49. Near the outer end of shaft 42 a second flange or collar 50 is rotatably and slidably mounted and is provided with a forwardly extending axial sleeve 50*a*. The outside diameter of flange 50 is substantially the same as the diameter of shoulder 48 for the purpose of rotatably supporting roll 49. A knob 51 is rotatably mounted on sleeve 50*a* of flange 50 and axially retained thereon by means of a collar 51*a*. Knob 51 at its inner extremity is provided with a four-lobe cam 51*b*, the lobes of which cooperate with four radially extending pawls 52, 52 which are spring-loaded by means of helical springs 52*a*

(Fig. 2) and retained axially on flange 50 by means of plate 50b. Rotation of knob 51 with respect to sleeve 50a serves to extend or contract pawls 52. When the feed roll 49 is installed, pawls 52 are retracted by means of knob 51, whereupon the roll 49 is slipped over flange 50 and positioned on shoulder 48. Both the flange 50 and the knob 51 are then moved outwardly until pawls 52 clear the outer end of the roll hub 53. In this position, knob 51 may be turned to expand the pawls, thereby retaining the flange assembly 50 axially within the hub 53 of roll 49. Variations in width of rolls 49 are readily accommodated by sliding collar 54 on shaft 42 by means of set screw 55. Spring 56 insures proper registry of flange 50 and pawls 52 against the hub 53 of the roll. While spring 56 is primarily intended to insure proper axial seating of pawls 52 against the end of hub 53, it may additionally in the case of non-adhesive tape rolls, be used to prevent undesirable over-riding of roll 49 during the unwinding operation.

Cutting head 60 is supported on bar 61 and rollers 62 and is adapted to move from right to left or vice-versa as seen in Fig. 1. Manual movement of cutting head is accomplished by means of knob 63 which turns pinion 64 to engage the teeth of rack 65 on the bottom of bar 61, Fig. 2. Supports 66 provide rigid alignment for guides 67 between which bar 61 moves.

Cutting head 60 is comprised of two side plates 68 connected by bars 69 and 70 (Fig. 6) which act as reinforcing members for side plates 68 and guides for knife holders 71. Also mounted on side plates 68, 68 are lugs 72, 72 carrying spacing bar 73.

Knife holders 71 (Figs. 5 and 6) are constructed in halves which are held together by screws 74. The knife holders 71 are adapted to slide crosswise on bars 69 and 70 and may be secured in any desired position by means of set screw 75. Each knife holder carries a knife 76 having its sharpened edge 77 disposed at a slight downward angle as shown in Fig. 5. Knives 76 are secured in knife holders 71 by means of set screw 78.

Rollers 79 are conveniently located between the feed and take-up mandrels and serve a particular purpose which will be described hereinafter.

In order to prevent slippage in the take-up roll particularly during the first few revolutions, the turning force applied through square shank 32 tends to push pins 37 radially outward thus tightly squeezing rubber sleeve 38 against the inside diameter of cardboard cylinder 80. It will thus be apparent that the greater the drag of knife 76 and spacer bar 73 on the take-up roll, the greater will be the pressure with which the take-up rolls are secured to the take-up mandrel.

Operation

The wide roll of uncut tape is inserted over flange 50, pawls 52 having been previously retracted by means of knob 51 and the core or hub of the roll is slipped over collar 48 on flange 46. Pawls 52 are then extended by turning knob 51 to securely position the roll 49 on the flanges. A cardboard cylinder 80 is then slipped over rubber sleeve 38. Such cardboard cylinders are well known in the art and are used as cores for many types of tape. The end of the tape 81 is fed over rollers 79 and attached to cylinder 80, cutting head 60 having previously been moved to the left in Fig. 2 by turning knob 63. After one or two turns of tape have been wound on the cylinder 80, cutting head 60 is then moved to the right until knives 76 lightly engage the tape or cylinder 80. Motor 10 is then turned on by means of switch 24 and tape 81 as well as cylinder 80 are slit as the take-up mandrel rotates. As the tape builds up on core 80, contact with spacing bar 73 moves the cutting head to the left in accordance with the rate of build-up. It will be apparent that the position of the tip of knife 76 with respect to spacing bar 73 should be such that the knife will cut substantially through cardboard core 80 when the operation commences. It has been found that either or both the angle 77 of knife 76 and the resistance of rack 65 and pinion 64 combine to feed the knife 76 into the take-up roll and it is against this feeding pressure that the layers of tape themselves act on spacer bar 73 to maintain correct positioning of knife 76 as the tape is wound on the cylinder 81. It is only necessary for the operator to urge the knife 76 lightly into the first layer of tape by means of knob 63 after which the slitting operation is entirely automatic. When all the tape has been wound on core 80, motor 10 may be stopped either manually or automatically and the narrow rolls removed from rubber sleeve 38.

Rollers 79 in addition to providing convenient means for transferring tape from the feed roller to the take-up cylinder also serve as tensioning means when a gummed tape is used since the tape tends to adhere to the rollers. The additional force required to pull the gummed tape from rollers 79 cooperates with the automatic take-up mandrel to prevent slippage of core 80 on sleeve 38 as described above.

Although the action of rollers 79 has been described with a gummed tape, this term has been used in reference to a tape having a sticky adhesive which requires no wetting. My slitting machine will operate to slit rolls of tape made of a wider variety of materials regardless of whether an adhesive is applied or not. Where there is no adhesive, the tensioning feature of rollers 79 described above will not, of course, be present.

It will be apparent, therefore, that I have provided a small light-weight tape slitter which is portable, inexpensive to manufacture, and which provides a wide range of adjustment with extreme accuracy and freedom from complicated feeding devices for the cutter bar. My machine can be used by an inexperienced operator with an absolute minimum of spoilage and if desired, an automatic stop may be incorporated to turn off the current to motor 10 should the tape break or when it has run off of the feed mandrel.

Having thus described my invention, I claim:

1. A tape slitting machine having a pair of side members, a pair of end members connecting the side members and forming a rectangular housing, a partition extending lengthwise in the housing, a jack shaft mounted on the partition and one side of the housing, a take-up shaft mounted on the partition and one side of the housing, bearings for the jack shaft and take-up shaft, gears for driving the take-up shaft from the jack shaft, means including an electric motor for driving the jack shaft, a shank on the take-up shaft having a substantially square cross section, a collar surrounding said shank, a plurality of convex segments surrounding the collar and having ends extending through the collar

to abut the sides of the shank, a resilient sleeve encircling the segments and compressing them radially inwards; a feed shaft journaled in the partition and a side member, a flange mounted on the feed shaft, a second flange mounted on the feed shaft, said second flange carrying a plurality of radially extendible pawls, means for extending and retracting said pawls; a cutting head slidably movable with respect to the take-up mandrel, guide means supported between the partition and a side member for the cutting head, means including a rack and pinion for moving the cutting head in the guide members, a spacer bar on the cutting head adapted to abut a layer of tape being wound on the take-up mandrel, a plurality of knife holders on the cutting head, means for locking the knife holders in any desired position on the cutting head, a knife blade in the knife holders having its cutting edge extending downwardly from the knife holder, and a pair of rollers positioned between the partition and a side member for guiding and tensioning the tape as it is fed from the feed mandrel onto the take-up mandrel.

2. The combination in a portable tape slitting machine of a take-up mandrel, a feed mandrel, a cutting head for engaging material being wound on the take-up mandrel, and a spacer bar on the cutting head for regulating the relative position of the cutting head with respect to the take-up mandrel.

3. The combination in a slitting machine of a take-up mandrel, a feed mandrel, a cutter slidably movable with respect to the feed mandrel, guides for the cutter, and means for manually advancing the cutter in the guides to begin the slitting operation.

4. The combination in a slitting machine of a take-up mandrel, a feed mandrel, a cutting head comprising a plurality of blades pointing downwardly away from the cutting head, and means for maintaining a spaced relationship between the blades and material wound on the take-up mandrel.

5. The combination in a slitting machine of a take-up mandrel, a feed mandrel, a cutting head comprising a plurality of blades pointing downwardly away from the cutting head, means for maintaining a spaced relationship between the blades and material wound on the take-up mandrel, and means on the take-up mandrel for gripping a take-up roll.

6. A take-up mandrel assembly for tape slitters and the like comprising a take-up shaft, a square shank on the take-up shaft, a collar enclosing the square shank, a plurality of convex segments encircling the collar, pins on the segments extending through the collar to abut the square shank, and a resilient sleeve for retaining the segments.

7. A cutting head for tape slitting machines and the like comprising a pair of side members, a backing member to which the side members are attached, a pair of reinforcing bars between the side members, a plurality of knife holders slidable on the bars, set screws in the knife holders for locking the knife holders on the bars in any desired position, knives secured in said knife holders, and means including a spacer bar secured to the side members for moving the cutting head assembly in proportion to the amount of material being cut by the knives.

8. The combination in a portable tape slitting machine of a take-up mandrel, a feed mandrel, a cutting head for engaging material wound on the take-up mandrel, a spacer bar on the cutting head for regulating the relative position of the cutting head with respect to the take-up mandrel, and an electric motor for operating the take-up mandrel.

L. EDWARD PAMPHILON.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,998,357	Carlson	Apr. 16, 1935
2,309,125	Krueger	Jan. 26, 1943

FOREIGN PATENTS

Number	Country	Date
92,363	Germany	June 16, 1897
633,600	France	Jan. 31, 1928