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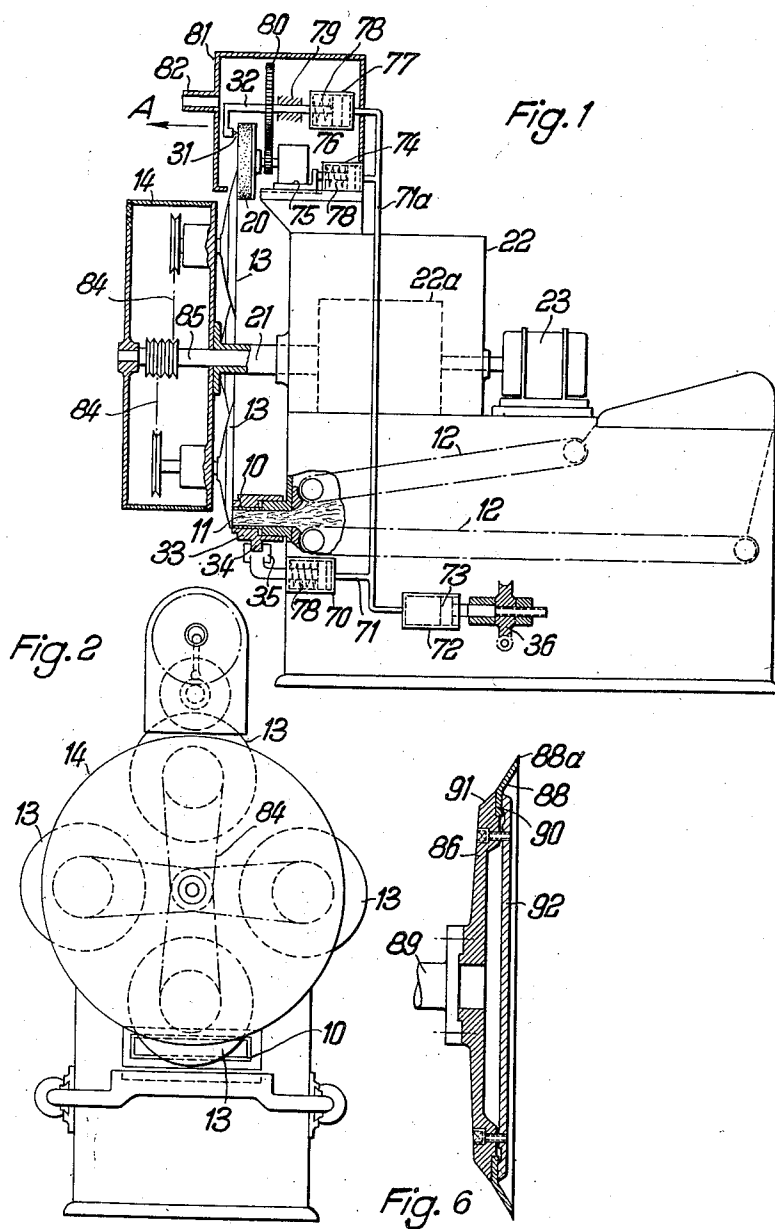
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TOBACCO CUTTER HAVING AUTOMATICALLY ADJUSTABLE MOUTHPIECE

Filed July 8, 1955

2 Sheets-Sheet 1



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Fig. 3

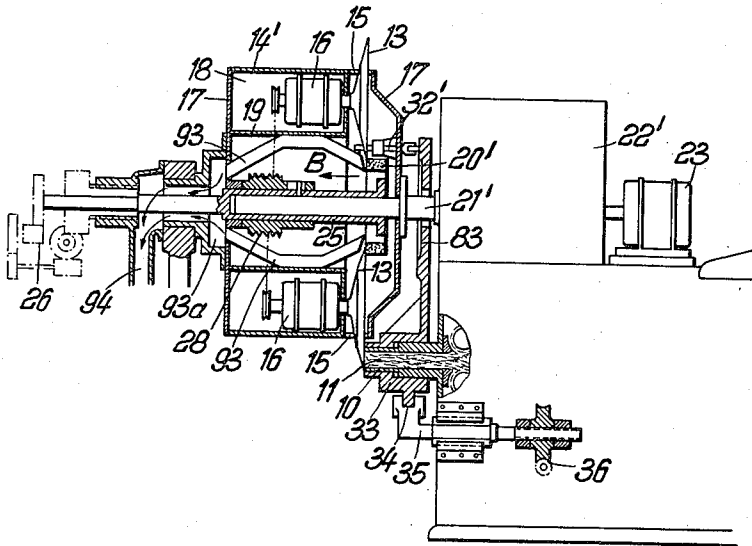


Fig. 4

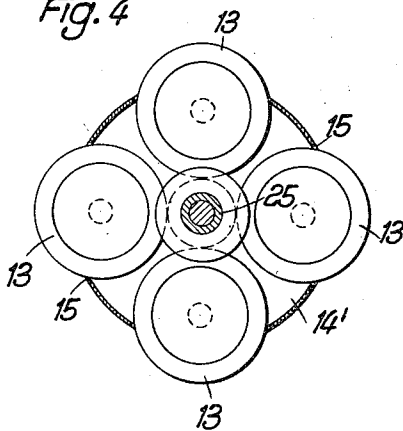
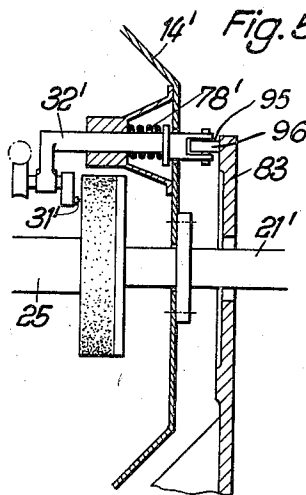


Fig. 5



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TOBACCO CUTTER HAVING AUTOMATICALLY ADJUSTABLE MOUTHPIECE

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The present invention relates to tobacco cutting machines, and more particularly to such machines in which the cutting means comprise a plurality of circular rotary knives, and in which the tobacco is conveyed through a channel and cut by said rotary knives at the mouth or orifice of said channel.

In tobacco cutting machines of this type it has been known prior to this invention to mount a plurality of circular rotary knives on a common rotating support so as to be individually rotatable thereon and to revolve as a unit with the support, and to move such knives past the mouth or orifice of the channel through which the tobacco is being fed. Also it has been known prior to this invention to provide means for regrinding the circular knives without requiring them to be dismounted from their support.

Although the use of circular knives in tobacco cutting machines has the considerable advantage over upwardly and downwardly moving guillotine-type knives that their cutting action is sliding rather than pressing, the machines previously employing such knives had the disadvantage that they could not be properly ground during the continuous operation of the machine since the emery and metal dust caused by the grinding operation would soil and smear the grinding disk preventing it from properly grinding the knives which consequently would become dull and would no longer produce a proper cut. This, in turn, would result in the formation of tobacco dust which, to make matters worse, would combine with the emery dust and metal dust and smear the grinding surface to such an extent that, instead of grinding, it would only soil the blades. It has therefore been found that it is not possible to operate such prior tobacco cutting machines having circular blades mounted on a revolving support so as to work in a fully continuous operation.

In these prior machines, as the knives became progressively dull, the entire common knife support was shifted continuously relative to the tobacco to be cut, for which purpose the drive shaft of the knife support was shifted in an axial direction within the stationary upper part of the housing of the machine by means of a suitable speed reduction gear. Thus, the circular rotating knives were adjusted by shifting the entire knife support in a direction toward the tobacco to be cut. To obtain such effect, these prior cutting machines had to be of a rather complicated construction.

It is an object of the present invention to provide a tobacco cutting machine in which the circular knives which are mounted on a common knife support are adjusted in a very simple manner and by the use of very simple means relative to the orifice through which the tobacco is being fed.

A further object of the present invention is to provide a tobacco cutting machine which may be operated fully continuously and in which the circular knives will be ground successively, properly, and very efficiently.

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Another object of the invention consists in the provision of means for almost entirely avoiding the formation of tobacco dust, and particularly for avoiding the intermingling of such dust with the metal and emery dust formed by the grinding operation, and for substantially preventing any dust from reaching the grinding surface of the grinding disks, so that the danger of soiling the grinding disks will be considerably reduced and they will be able to resharpen the knives more properly and efficiently. Consequently, the operation of the machine according to the invention does not require any periodic interruption, either for grinding the knives or for cleaning or exchanging the grinding disk or disks because they have become smooth or smeary from grinding and from tobacco dust. The cutting operation may therefore be continued without interruption for a long time or until the knives or the grinding disk or disks are worn to such an extent that they must be replaced by a new set.

The present invention is based upon the discovery that by reversing the position and relative movement of the respective parts so that the mouth or orifice of the channel through which the tobacco is being fed toward the cutting point be shifted relative to the revolving knife support and thus to the knives themselves, the infeed adjustment of the circular knives may be effected with much more simple means and in a much simpler manner, as well as more uniformly and efficiently than was possible in the machines known prior to this invention.

The present invention therefore consists in mounting the mouth or orifice of the channel through which the tobacco is being fed to the circular cutting blades so as to be movable in a direction parallel to the axis of the knife support, and in shifting the orifice continuously and in accordance with the wear of the rotating knife blades in a direction toward these blades which are mounted in a relatively stationary position.

An important advantage of such design and construction of the machine resides in the fact that the operation of such infeeding mechanism does not result in any variation in the distance between the machine housing and the knife support, and that the driving mechanism of the knives, as well as the mechanism for properly positioning the cutting edge of the rotary blades and the grinding means may be made of a very simple construction and in a manner and design so that both the grinding means, as well as the means for driving the circular knife blades, will be protected from being soiled.

A further object of the present invention consists in the provision of means for adjusting the grinding means, for example, a grinding disk, in accordance with the wear of the circular knife blades, and in providing a special dressing or truing device for trimming the grinding disk, for example, by means of a truing diamond which, by the provision of a suitable locating device, is secured within the same plane with the front edge of the movable orifice through which the tobacco is being fed to the knife blades.

Other important objects of the present invention consist in the provision of suitable suction means for removing the grinding dust, and in a novel and highly advantageous design of the circular knife blades.

Still further objects, features, and advantages of the present invention will be apparent from the following detailed description thereof, as well as from the accompanying drawings, in which—

Fig. 1 shows, partly in cross section, a side view of a tobacco cutting machine according to the invention, in which, for a better illustration of the inventive features the drive mechanism has only been indicated diagrammatically;

Fig. 2 shows a front view of the machine shown in Fig. 1;

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Fig. 3 shows a modification of the machine according to the invention;

Fig. 4 shows a front view of the arrangement of the circular knife blades as shown in Fig. 3;

Fig. 5 shows a trimming or truing device which may, for example, be used in the machine according to the invention, such device being shown on an enlarged scale and partly in cross section;

Fig. 6 shows a cross section through a circular knife blade of the invention.

Referring to the drawings, and first particularly to Figs. 1 and 2, the tobacco cutting machine includes a mouth piece 10 through which the tobacco 11 to be cut is fed in a manner known as such, that is, for example, by means of upper and lower conveyer belts 12 which, together form a funnel-like conveyer channel.

For cutting the tobacco, a plurality of circular platelike knife blades 13, for example, four, are mounted on a revolving knife support 14 which, in turn, is mounted on a shaft 21 which in this particular embodiment of the invention has been shown to be hollow. The knife support 14 is designed in the form of a drumlike housing on which the knife blades 13 are mounted on suitable shafts. Drum 14 serves as an enclosure of the driving means for the knife blades 13 which may, for example, consist of a multiple pulley drive 84 which is driven by a shaft 85 extending through the hollow shaft 21. Both shafts 21 and 85 are preferably driven by a common motor 23 through an intermediate gear system 22a provided in the upper part 22 of the machine housing.

The mouthpiece 10 of the tobacco feed channel is movable independently of the channel itself and in a direction parallel to the axis of the knife support 21, and a specially designed driving mechanism 36 is adapted to move the mouthpiece 10 continuously in a direction toward the rotating knife blades 13 which are individually mounted in a relatively stationary position on the housing 14 and are moved past the orifice of mouthpiece 10 by the rotation of housing 14, the position of which relative to the framework or housing of the machine does likewise not change. The speed of movement of the mouthpiece 10 is made in accordance with the wear to which the knife blades 13 are subjected during the cutting operation. Thus, for example, as shown in Fig. 1, the mouthpiece 10 consists of a slidable sleeve 33 which has a projection 34 which engages with a movable slide 35 which is shifted by the piston of a hydraulic cylinder 70 in a direction toward the circular knife blades 13 which are moved past the orifice of mouthpiece 10.

Hydraulic cylinder 70 is connected through a pipe line 71 with a second hydraulic cylinder 72, the piston 73 of which is continuously moved forwardly by means of a suitable drive, such as, for example, a worm gear 36, so that the mouthpiece 10 will at all times be moved into engagement with the circular knife blades 13 regardless of how much they might have been worn.

For grinding the blades 13, special grinding means are provided, which may consist, for example, of one or more grinding disks 20 which are likewise adjustable relative to the blades 13 in accordance with the wear thereof. For this purpose, such adjustment is similarly effected by a slide 75 which is acted upon by a hydraulic cylinder 74 and also acts as a support of a motor 76 which drives the grinding disk 20.

The present invention furthermore provides a trimming or truing mechanism which may consist, for example, of a truing diamond 31 which is mounted on an adjustable eccentric arm 32. This arm 32 is moved by the piston of a hydraulic cylinder 77 in the direction shown by the arrow A to the same extent as the mouthpiece 10. For this purpose, hydraulic cylinder 77 is connected by a pipe line 71a to the main pressure line 71. Each of the hydraulic pistons 70, 74, and 77 operates against the action of a return spring 78.

The adjustable eccentric arm 32 of the truing diamond 31 is rotatably mounted in a bearing 79 and driven by a

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gear 80 which, in turn, is driven by the motor 76 which drives the grinding disk 20 so that it will trim the latter in accordance with the speed of rotation thereof. Both the grinding disk 20 and the truing device including their driving mechanisms are preferably enclosed within a cover 81 to which a suction pipe 82 is connected through which the emery and metal dust caused by the grinding operation, as well as any tobacco particles which might have been carried along will be drawn off and removed.

It is a particular feature of the present invention that the cutting edge of the circular knife blades 13, the grinding edge of the grinding disk 20, and the trimming point of the truing diamond 31 will thus be always positioned within the same vertical plane with the front edge of the mouthpiece 10, regardless of whether the knife blades are worn or ground off, or are either ground or merely honed.

In the modification of the tobacco cutting machine as shown in Fig. 3, the mouthpiece 10 through which the tobacco 11 is being fed in a similar manner as shown in Fig. 1 is adjusted by mechanical means, for example, directly by a worm gear 36 or similar means acting on the slide 35.

Also in this embodiment, the circular blades 13 are mounted on a drumlike housing 14' which also acts as a revolving knife support. However, in this case the knife blades 13 are also partly enclosed by the housing 14' by means of one or more removable covers 17 which may be connected to the housing proper so as to provide slots 15 therein through which only that portion of the knife blades 13 projects which is actually required for cutting.

The driving means for each individual knife blade 13 of this embodiment have been illustrated, for example, as consisting of individual motors 16 which are mounted within the drumlike knife support 14', and preferably within a separate compartment 18 which is formed, for example, by an inner drumlike wall 19.

For maintaining the circular knife blades 13 always in a sharp condition, one or more grinding disks may be provided within the housing 14' forming the common knife support. In the specific embodiment illustrated in Fig. 3, only one grinding disk 20' is provided for grinding all of the knife blades 13. This grinding disk 20' is mounted independently of the knife support 14' so as not to be affected by the rotation thereof. For this reason, grinding disk 20' is also provided with a separate driving mechanism.

The substantially cylindrical knife support 14' is driven in a similar manner as shown in Fig. 1 by a drive shaft 21' which is mounted within the housing 22' of the machine and driven by a motor 23 through an intermediate gear transmission which has not been shown in the drawing.

Grinding disk 20' is designed so as to be movable slowly and automatically in the direction shown by the arrow B. This would be true also if several grinding disks would be provided in the machine. Both the rotation, as well as such slow and automatic movement of grinding disk 20' in a direction toward the knife blades 13 may be effected, for example, by mounting it on a hollow shaft 25 which, in turn, is rotatably mounted on the drive shaft 21' without, however, being connected thereto. Hollow shaft 25 is driven, for example, through pulleys by the motors 16 of the knives 13, while simultaneously a suitable reduction gear 26 gradually draws the hollow shaft 25 toward the left as shown in Fig. 3, for example, through a spindle drive.

It constitutes another important feature of the present invention that the grinding disk or disks 20 are provided with special trimming means which are likewise enclosed within a closed cylindrical housing or knife support 14'. These trimming means may, for example, consist of one or more truing diamonds 31', which are driven so as to revolve along the grinding surface of grinding wheel 20', and are mounted on an adjustable arm 32'.

In order that also in this embodiment the cutting edge of the knife blades 13, the grinding edge of the grinding disk 20', and the trimming point of the truing diamond 31' will always be disposed within a plane extending vertically to the driving axis 21', it is necessary to subject the trimming device 31', 32', to the action of a spring 78', and during the rotation of the knife support 14' to allow it to abut against a plate 83 which is rigidly connected with the movable mouthpiece 10, as shown in Fig. 3, and bears a locating stop 95 which stop is moved in accordance with the movement of said mouthpiece and is engaged by roller means 96 provided at the one end of arm 32.

In order to remove the metal and emery dust which is continuously formed during the grinding operation of the circular knife blades 13 and to prevent such dust from soiling and smearing the grinding disk 20' and from collecting in and soiling the drum 14' which forms the knife support, as well as all the elements contained in such drum, suction pipes 93 are provided within the drum 14' which are connected to a vent 94. In the embodiment shown in Fig. 3, the suction pipes 93 are shown as being first connected to a suction chamber 93a which is attached to the outer walls of the drum 14', and from which the grinding dust is then passed in an axial direction to the vent 94.

Since the circular blades 13 are ground along the inner periphery of their common circular movement, they will engage with the grinding disk within shorter time intervals than if the latter was mounted so as to act upon their outer periphery. Furthermore, such arrangement permits all the rotary movable elements of the machine to be enclosed so as to form a single self-contained unit and of much smaller outer dimensions than those of a machine in which the grinding and trimming means are mounted outside of the periphery of the knives.

The trimming or truing of the grinding disk in either of the embodiments shown in Figs. 1 and 3 by means of the trimming mechanism 31, 32, or 31', 32' is carried out periodically and while the grinding operation is taking place. This is obtained by the eccentric arrangement of these trimming means, including the truing diamond 31 or 31'. While the grinding disks are being trimmed, it is preferable to interrupt their grinding operation on the knife blades so that the knives will be able to cool off during such time interval.

The mechanism may, for example, be designed so that the trimming of the grinding disk will consume about one third of the time required for the grinding, while for the remaining two thirds of such time no trimming of the grinding disk will be carried out. Thus, the knives will be ground when the trimming or truing means no longer engage with the grinding disk.

Suitable means may also be provided to render the operation and control of the new machine fully automatic and with the trimming operation in a properly timed relation to the operation of the other parts.

In the knife as shown in Fig. 6, the annular cutting blade 88 which is secured to the base plate 86 is bent in the direction toward the tobacco to be cut and at an angle to its drive shaft 89 so that the cutting edge 88a faces the material to be cut.

Although my invention has been illustrated and described with reference to the preferred embodiments thereof I wish to have it understood that it is in no way limited to the details of such embodiments or to the specific examples described, but is capable of numerous modifications within the scope of the appended claims.

Having thus fully disclosed my invention, what I claim is:

1. In a tobacco cutting machine comprising a knife support, means for rotating said support about its central axis, a plurality of circular knives mounted on said support, means for rotating each of said knives about its own central axis, feeding means for supplying tobacco

to said knives, said feeding means comprising a mouthpiece having an orifice through which said tobacco is adapted to be fed, said support being adapted to revolve said rotating knives successively past said orifice so as to cut said tobacco, the improvement of means for continuously adjusting the position of said mouthpiece in accordance with the wear upon said knives and in a direction parallel to the axis of said knife support and toward said revolving knives while said knives are rotating on said support past said orifice, and wherein said mouthpiece comprises a slidable sleeve having a projection, and wherein said means for continuously adjusting the position of said mouthpiece comprise a movable slide having a groove, said movable slide engaging said projection of said slidable sleeve of said mouthpiece, a hydraulic cylinder and a piston within said cylinder, said movable slide being shifted by said piston in the direction toward said circular knife blades moved past said orifice of said mouthpiece.

2. A tobacco cutting machine comprising a knife support, means for rotating said support about its central axis, a plurality of circular knives mounted on said support, means for rotating each of said knives about its own central axis, feeding means for supplying tobacco to said knives, said feeding means comprising a mouthpiece having an orifice through which said tobacco is adapted to be fed, said support being adapted to revolve said rotating knives successively past said orifice so as to cut said tobacco, means for continuously adjusting the position of said mouthpiece in accordance with the wear upon said knives and in a direction parallel to the axis of said knife support and toward said revolving knives while said knives are rotating on said knife support past said orifice, grinding means, said grinding means for adjusting the position of said grinding means relative to said knives in accordance with the wear upon said knives, means for trimming said grinding means, means for maintaining said trimming means within the same plane with the front edge of said orifice, means for controlling the operation of said trimming means so as to trim said grinding means automatically and periodically, further comprising suction means disposed adjacent said grinding means and trimming means for drawing off the dust produced by the grinding and trimming operations.

3. A tobacco cutting machine as defined in claim 2, wherein said means for maintaining said trimming means within the same plane with the front edge of said orifice comprise a locating stop, means for moving said stop in accordance with the movement of said mouthpiece, and means connected to said trimming means for constantly engaging said stop.

4. A tobacco cutting machine as defined in claim 2, wherein said means for maintaining said trimming means within the same plane with the front edge of said orifice comprise a locating stop mounted on said mouthpiece and movable therewith, and means connected to said trimming means for constantly engaging said stop.

5. A tobacco cutting machine as defined in claim 3, wherein said last means include spring means on said trimming means for constantly urging the same into engagement with said movable stop.

6. A tobacco cutting machine as defined in claim 2, wherein said knife support forms a drumlike, substantially closed housing, said knives, knife rotating means, grinding means, trimming means, and suction means being mounted substantially within and enclosed by said housing.

7. A tobacco cutting machine as defined in claim 2, wherein said means for rotating said knife support comprise a drive shaft, means for driving said shaft, said knife rotating means comprising at least one motor mounted within said knife support, and means for connecting said motor with said knives, and means for driving said grinding means, said grinding means driving means comprising a hollow shaft rotatably mounted in a tele-

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scoping relation on said drive shaft, said grinding means being mounted on said hollow shaft, and pulley means on said hollow shaft and said second motor and within said knife support for driving said hollow shaft independently of said drive shaft.

8. A tobacco cutting machine as defined in claim 7, wherein said means for adjusting the position of said grinding means relative to said knives comprises means for moving said hollow shaft in an axial direction relative to said drive shaft.

9. A tobacco cutting machine as defined in claim 7, further comprising means for driving said trimming means, said means for adjusting the position of said grinding means relative to said knives comprising means for sliding said hollow shaft in an axial direction relative to said drive shaft, and control means for controlling the speed of movement of said adjusting means of said mouth piece, the means for driving said trimming means, the means for adjusting the position of said driving means, and said

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drive shaft of said knife support in a timed relation to the speed of said knives.

10. A tobacco cutting machine as defined in claim 9, wherein said control means also control the movement of said trimming means so as to trim said grinding means periodically, and interrupt the grinding operation of said knives during such trimming operation so as to permit said knives and grinding means to cool during said trimming operation.

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References Cited in the file of this patent

UNITED STATES PATENTS

1,852,397	Berger	Apr. 5, 1932
2,226,782	Sandberg	Dec. 31, 1940
2,464,896	Schreiber	Mar. 22, 1949

15

FOREIGN PATENTS

410,174	Great Britain	May 11, 1934
710,400	Great Britain	Dec. 23, 1953