

Aug. 30, 1949.

W. MITCHELL, JR

2,480,591

APPARATUS FOR FOLDING AND WINDING STRIP MATERIAL

Filed July 10, 1945

2 Sheets-Sheet 1

Fig. 1.

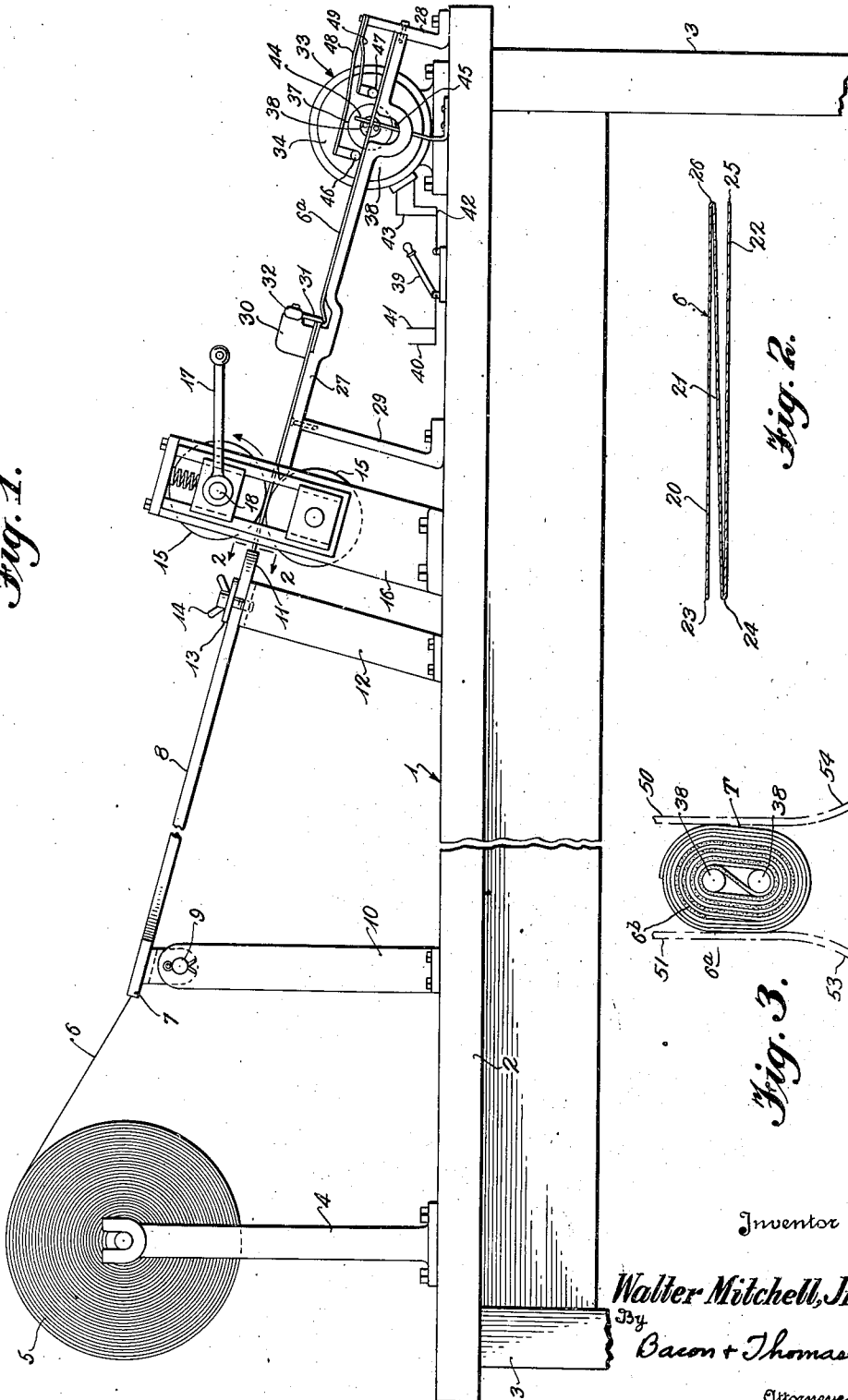


Fig. 2.

Fig. 3.

Inventor

Walter Mitchell, Jr.

By

Bacon + Thomas

Attorneys

Aug. 30, 1949.

W. MITCHELL, JR

2,480,591

APPARATUS FOR FOLDING AND WINDING STRIP MATERIAL

Filed July 10, 1945

2 Sheets-Sheet 2

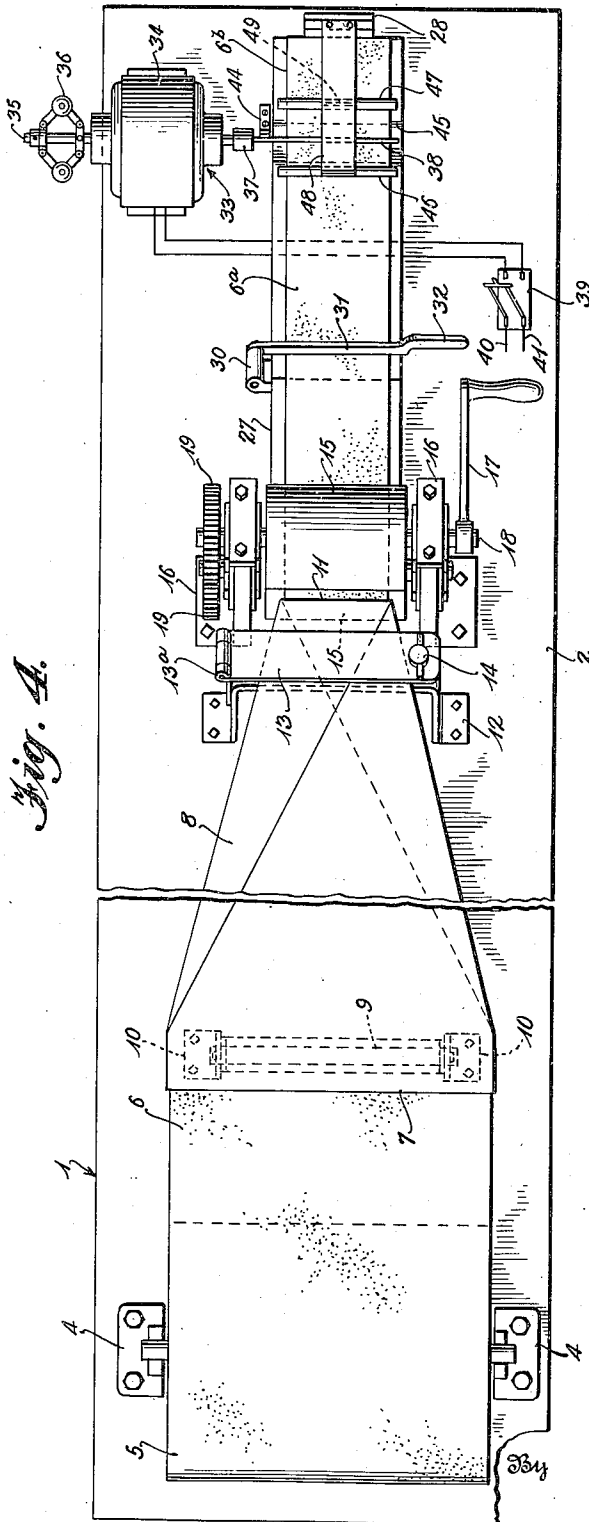


Fig. 4.

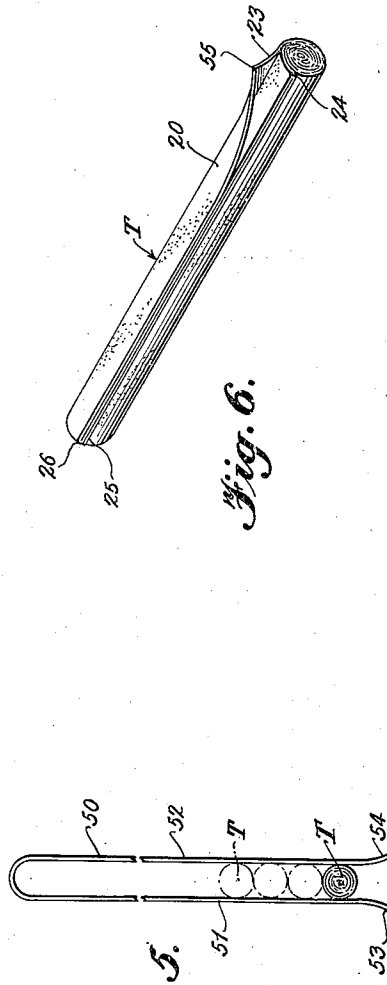


Fig. 5.

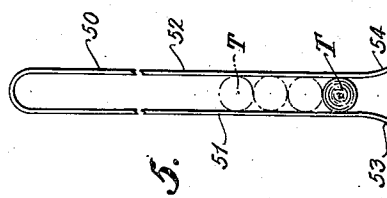


Fig. 6.

Inventor

Walter Mitchell, Jr.
Bacon + Thomas

Attorneys

UNITED STATES PATENT OFFICE

2,480,591

APPARATUS FOR FOLDING AND WINDING
STRIP MATERIAL

Walter Mitchell, Jr., Scarsdale, N. Y.

Application July 10, 1945, Serial No. 604,272

3 Claims. (Cl. 242-55)

1

The present invention relates to an apparatus for folding and winding strip material.

More particularly, the invention relates to a novel apparatus for producing rolled paper tissue.

The principal object of the invention is to provide apparatus for producing tissue, such as soft facial tissue, in a form convenient for packaging in a small wrapper or small carton that can be conveniently carried in a woman's purse or a man's pocket. The tissue products heretofore commercially available have been packaged in cartons of such size as to preclude their being conveniently carried in either a purse or a pocket. Consequently, persons have been forced to resort to the practice of carrying a number of such tissues in loose form, but this is unsanitary because of the contact of the tissues with the lining and/or other articles in a purse or pocket, and is also unsatisfactory because of the difficulty of separating a single tissue from a group that has been folded or crumpled.

The present invention eliminates the foregoing objections to presently available commercial tissues by providing means whereby individual extractable tissues can be conveniently wrapped or packaged in a container, and in any number desired, the package or container being small enough in any event to be conveniently carried in either a purse or pocket. The tissues are preferably individually rolled, and hence are individually extractable from the wrapper or container for use as desired. A convenient form of pocket-size container for the rolled tissues is disclosed in my copending application, Serial No. 405,853, filed August 7, 1941, now Patent No. 2,382,368 of August 14, 1945.

Another object of the invention is to provide a relatively simple apparatus for making folded and rolled tissues of the character aforescribed.

A still further object of the invention is to provide means for winding a strip of tissue material into a compact roll.

A more specific object of the invention is to provide means for stripping individually rolled tissues from the winding apparatus and for retaining a multiplicity of the rolled tissues together as a group for wrapping in "cellophane" or other material, or for use in inserting the rolled tissues into a carton as a group.

Other objects and advantages of the invention will be apparent from the following description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is a somewhat diagrammatic front eleva-

2

tional view of apparatus embodying the principles of the present invention;

Fig. 2 is an enlarged sectional view through a folded strip of tissue material taken on the line 2-2 of Fig. 1;

Fig. 3 is a greatly enlarged diagrammatic end view of a wound roll of tissue prior to its removal from the fingers of the winding apparatus;

Fig. 4 is a plan view of the apparatus shown in Fig. 1;

Fig. 5 is a view of a spring clip that may be employed to strip the rolled tissue from the winding fingers shown in Fig. 3 and which may be employed to retain a multiplicity of the rolled tissues in convenient form for packaging; and

Fig. 6 is a perspective view of a rolled tissue illustrating the manner in which one of the corners at the end of the rolled tissue is available for grasping by the fingers of the user to effect instantaneous unfurling and unfolding of the tissue for immediate use.

Referring now to the drawings, the numeral 1 generally indicates a machine frame including a base 2 and supporting legs 3. A pair of brackets 4 is mounted upon the base 2 adjacent one end thereof for supporting a roll of conventional or suitable tissue paper 5. The roll of tissue 5 normally consists of two layers and is about 10" in width. However, the tissue need not be laminated and a single ply of suitable weight material is equally useful in practicing the invention. Likewise, the width of the roll 5 is not critical and may be varied as desired.

The web or strip of tissue provided by the roll 5 is conveniently identified by the numeral 6. The free end of the strip 6 is introduced into one end 7 of a suitable folding device 8 by a leader strip (not shown). In order to facilitate the threading of the strip 6 through the folding device 8, the end 7 thereof is preferably hingedly supported upon a rod 9 supported in brackets 10 mounted on the base 2. The discharge end 11 of the folding device 8 is detachably secured to the upper end of a U-shaped bracket 12 by a bar 13 hinged at 13^a and whose free end is fastened to said bracket by a wing bolt 14, the bracket 12 being mounted upon the base 2. The folding device 8 is preferably of such character that the strip 6 is altered during its passage therethrough from a wide flat transverse cross-section into a strip which is folded in accordian fashion so that it is relatively narrow and generally Z-shaped in transverse cross-section.

The strip 6 is drawn through the folding device 8 by a pair of conventional feed rolls 15

3

carried by brackets 16, which are also mounted upon the base 2. The feed rolls 15 may be either mechanically or manually driven, but for convenience in illustration, a manually operable crank 17 has been shown connected with one end of a shaft 18 associated with the upper feed roll. The feed rolls 15 are interconnected in driving relation by gears 19, in a manner well understood.

The cross-sectional shape of the strip 6 after it has been folded is diagrammatically illustrated in Fig. 2, and it will be noted therefrom that said strip comprises an upper web or layer 20, an intermediate web or layer 21 and a lower web or layer 22. The upper layer 20 terminates in a longitudinal edge 23 which is disposed in substantially the same vertical plane as the longitudinally extending fold 24 disposed between the intermediate web 21 and the lower web 22. It will also be noted that the lower web 22 has an outer edge 25 which terminates in substantially the same vertical plane as the longitudinally extending fold 26 disposed between the upper web 20 and the intermediate web 21.

The folded strip 6 is received by and moves downwardly upon a platform 27 which is preferably inclined toward a combined support and stop 28 mounted upon the base 2 at the lower end of said platform. The upper end of the platform is supported by a bracket 29 (Fig. 1) mounted upon the base 2. A conventional or suitable cut-off device 30 is mounted upon the inclined platform 27 and includes a blade 31 which is adapted to be either manually or mechanically operated to cut the folded strip into suitable lengths, say of about ten inches, so that each individual tissue in its fully unrolled and unfolded condition consists of a square having ten-inch sides. For convenience in illustration, the blade 31 has been illustrated as manually operable and provided with a handle 32.

The folded and severed strip is identified for convenience by 6^a, and its length may be determined by the distance that the blade 31 is disposed from the stop 28, in which case the blade 31 can be operated upon engagement of the end of the strip 6^a with said stop to produce strips of the desired length. The strip 6^a is adapted to be rolled by a manual or power driven winding device. A power driven winding device is preferred and one such device is generally identified by the numeral 33, and will now be described. The winding device 33 includes a small electric motor 34 having a shaft 35. A conventional or suitable speed control governor 36 (see Fig. 4) is secured to one end of the shaft 35, whereby to limit the speed of rotation of the motor 34 to about 120 R. P. M. This speed has been found by experiment to produce highly satisfactory rolling of the tissues. The opposite end of the shaft 35 has a mandrel 37 secured thereto for rotation therewith. A pair of smooth, round wire fingers 38, about $\frac{1}{8}$ inch in diameter and spaced about $\frac{1}{8}$ of an inch apart, is mounted in the mandrel 37, and these fingers extend transversely of the folded web 6^a, with one finger on either side of said web. The fingers 38 rotate about an axis which substantially coincides with the plane of the web 6^a. Furthermore, the fingers 38 are arranged so that upon rotation thereof they will engage the strip 6^a at a point between one end of said strip and the mid point of said strip, say in a zone located about $\frac{1}{3}$ the length of the strip from the stop 28. Thus, the fingers 38 engage the strip 6^a at such point that all side thrust

4

on said fingers is eliminated, thereby making it possible to use fingers which are quite small in diameter and which, therefore, do not appreciably increase the bulk of the rolled tissue.

The motor 34 may be manually or otherwise controlled and for convenience a manually operated switch 39 has been shown mounted upon the base 2 adjacent said motor. The switch 39 is connected to service leads 40 and 41 and conductors 42 and 43 connect the switch with the motor 34. It will be understood that the circuit to the motor 34 is open during the feeding of the folded strip 6 toward the stop 28. In order to avoid interference with such feed, a flat spring 44 is arranged to engage the sides of the fingers 38 causing said fingers to come to rest in a predetermined position with one finger disposed above and the other below the plane of feed of the web 6. The fingers 38 are engaged by the free end of the flat spring 44 as best illustrated in Fig. 1 and the opposite end of said flat spring is secured to the base 2. Hence, the fingers 38 assume a predetermined position of rest whenever the circuit to the motor 34 is interrupted. The feed rolls 15 flatten the folds 24 and 26 of the strip 6 and press the webs 20, 21 and 22 together so that said strip enters the space between the winding fingers 38 without difficulty.

The fingers 38 extend into a recess 45 formed in the platform 27. The recess 45 is, of course, large enough to accommodate the rolled tissue resulting from the winding of the strip 6^a upon the fingers 38. It is important to subject the strip 6^a to tension while it is being wound because it has been found that such tensioning tends to maintain the tissue in a tightly rolled condition after the winding operation has been completed. Accordingly, the web 6^a may be tensioned manually by applying pressure thereto with the hand of the operator at points on opposite sides of the axis of rotation of the fingers 38 during the winding operation. Alternatively, tension may be mechanically applied to the web 6^a while it is being wound by any suitable tensioning device such as the bars 46 and 47 which engage the strip 6^a and frictionally press the same against the platform 27 on opposite sides of the axis of rotation of the fingers 38. The bar 46 is urged toward the strip 6^a by a flat spring 48 and the bar 47 is similarly urged toward said strip by a flat spring 49. It will be understood that the tensioning bars 46 and 47 are raised either manually or otherwise while the strip 6 is fed down the platform 27 toward the stop 28, and that said bars are lowered into frictional engagement with said strip prior to the starting of the winding operation. The tensioning bars 46 and 47 not only tension the strip 6^a, but serve the further purpose of causing the strip 6^a to draw the flexible fingers 38 closer together at the start of the winding operation, so that the resulting rolled tissue is compactly wound throughout.

In view of the fact that the winding fingers 38 engage the severed strip 6^a at a point about $\frac{1}{3}$ the length of the strip from one end thereof, the end of the rolled tissue will present the appearance diagrammatically illustrated in exaggerated scale in Fig. 3. It will be noted that the effect of starting the rolling of the tissue at a point spaced from one end thereof is the same as if the folded tissue had been overlapped upon itself along a transverse line corresponding to the zone occupied by the fingers, so that the core of the tissue consists of a multiple ply of folded

tissue and its outer periphery of a single ply of folded tissue. The portion 6^b of the strip 6^a which lies between the stop 28 and the fingers 38 has been stippled in Fig. 3 to more clearly illustrate the multi ply core.

After the rolling of the tissue under tension has been completed, the circuit to the motor 34 is opened and the fingers 38 are caused to come to rest in a predetermined position by the flat spring 44, as previously pointed out. The completely rolled tissue is identified for convenience by the letter T. The rolled tissue T is stripped from the fingers 38 by the hand of the operator, by sliding the tissue off the free ends of the fingers 38. Due to the fact that the tissue has been rolled under tension, it does not tend to unroll when removed by the hand of the operator. However, it is preferable that the tissue remain untouched by the hand of the operator and, hence, mechanical stripping means has been devised for such purpose. Such mechanical stripping means may be in the form of individual spring clips 50 (Fig. 5). The clip 50 consists of a strip of resilient metal bent into a general U-shape to provide legs 51 and 52 which have outwardly turned ends 53 and 54 to better enable the same to be slipped over a rolled tissue while it is still on the winding fingers 38, as shown in dot and dash lines in Fig. 3. In using the clip 50, the same is brought into such position that the lower ends of the legs 51 and 52 pressurally grip the rolled tissue T therebetween, and stripping of said rolled tissue from the fingers 38 is effected by moving the clip 50 bodily in a direction away from the motor 34. The rolled tissue T is held under sufficient pressure by the clip 50 to be retained in place between the legs 51 and 52 after the stripping operation has been completed.

Successfully rolled tissues T may be removed by repeating the foregoing operation, the previously removed rolled tissue being forced upwardly into the space between the legs 51 and 52, as each newly rolled tissue is removed by the clip 50. Thus, the legs 51 and 52 of the clips 50 may be made of a length sufficient to retain ten or more rolled tissues therebetween. The tissues thus retained by the clips 50 may be subsequently stripped therefrom and inserted into a suitable container or enclosed in a suitable wrapper, the clips 50 then being available for use for successively removing additional rolled tissues from the winding fingers 38.

It will be apparent that packaging of the rolled tissues is greatly facilitated by the use of the clip 50, which can be conveniently inserted into the open end of a carton (not shown) and then withdrawn, the outermost tissue being suitably held in place in the carton while said clip is being withdrawn.

One of the important features and advantages of a tissue rolled in accordance with the present invention resides in the fact that it can be instantly unfurled and unfolded by a simple rapid movement of the hand in the air. Thus, a rolled tissue T upon removal from a carton or other container (not shown) will present the appearance shown in Fig. 6. Due to the manner in which the tissue T has been rolled, the edge 23 of the upper web 20 can be readily separated from the fold 24 so as to provide a corner 55 which can be readily grasped by the thumb and index and third fingers. The rolled tissue thus held can be quickly unfurled and unfolded by a quick downward movement of the hand, the inertia of the roll causing the same to readily unwind and

the air resistance effecting unfolding of the tissue. Of course, the user may slowly unfurl and unfold the tissue by using both hands, but a full and complete opening of the tissue can be effected instantly in the simple manner described.

While apparatus has been illustrated herein for effecting folding and rolling of the tissue material, it will be understood that the tissue may be folded, rolled and tensioned by hand, although production by such means would be slow and more expensive than machine folding, rolling and tensioning. If hand rolling is employed, the longitudinally folded strip may be overlapped upon itself by folding over the portion 6^b along a line a distance about $\frac{1}{2}$ the length of the strip from one end thereof and the rolling of the strip started at the overlapped end. The overlapping of the strip is important from the standpoint that as the tissue is unrolled, the overlapped portion 6^b at the core readily unfurls and interference to free unfolding of the tissue which might occur if rolling started at one extremity of the tissue is eliminated.

It will be understood that various changes may be made in the details of construction and arrangement of the parts of the apparatus disclosed herein without departing from the spirit of the invention or the scope of the annexed claims.

I claim:

1. Apparatus for winding strip material, comprising: a pair of substantially parallel fingers spaced apart a sufficient distance to straddle a strip of material to be wound thereby; and a generally U-shaped spring clasp engageable with the wound strip of material at a point intermediate the edges of said strip for stripping said wound strip of material from said fingers.

2. Means for winding strip material, comprising: a pair of substantially parallel fingers spaced apart a sufficient distance to straddle a strip of material to be wound thereby; means for rotating said fingers about an axis substantially coinciding with the space between said fingers; and yieldable means disposed to one side of the axis of rotation of said fingers, said yieldable means being engageable with both of said fingers to bring said fingers to rest in a predetermined position.

3. Means for winding strip material, comprising: a pair of substantially parallel fingers spaced apart a sufficient distance to straddle a strip of material to be wound thereby; means for rotating said fingers about an axis substantially coinciding with the space between said fingers; and a spring strip extending transversely of and to one side of the axis of rotation of said fingers, said spring strip being engageable with the sides of said fingers to bring said fingers to rest in a predetermined position.

WALTER MITCHELL, JR.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
409,447	Block	Aug. 20, 1889
478,345	Linthicum	July 5, 1892
745,240	Rolland	Nov. 24, 1903
781,927	Adams	Feb. 7, 1905
797,483	Wilkins	Aug. 15, 1905
848,400	Sandell	Mar. 26, 1907

(Other references on following page)

2,480,591

7

UNITED STATES PATENTS

Number	Name	Date
952,282	Skofsrud	Mar. 15, 1910
1,090,304	Hildebrandt	Mar. 17, 1914
1,104,415	Cottini et al.	July 21, 1914
1,113,823	Peterson	Oct. 13, 1914
1,159,781	McCoy	Nov. 9, 1915
1,194,045	Luellen	Aug. 8, 1916
1,480,236	Arelt	Jan. 8, 1924
1,499,307	Parkes	June 24, 1924
1,562,610	Baird	Nov. 24, 1925
1,717,120	Richardson	June 11, 1929

Number

1,753,764
1,762,612
1,884,784
1,945,483
1,959,614
1,992,179
2,119,445
2,135,668
2,286,500
2,346,219
2,377,216

5

10

8

Name

Date

Willard	Apr. 8, 1930
Cooper	June 10, 1930
Marcalus	Oct. 25, 1932
Gluck et al.	Jan. 30, 1934
Coons	May 22, 1934
Blosser et al.	Feb. 26, 1935
Scott	May 31, 1938
Judelshon	Nov. 8, 1938
Morrill, Jr., et al	June 16, 1942
Johnson	Apr. 11, 1944
Duckoff	May 29, 1945