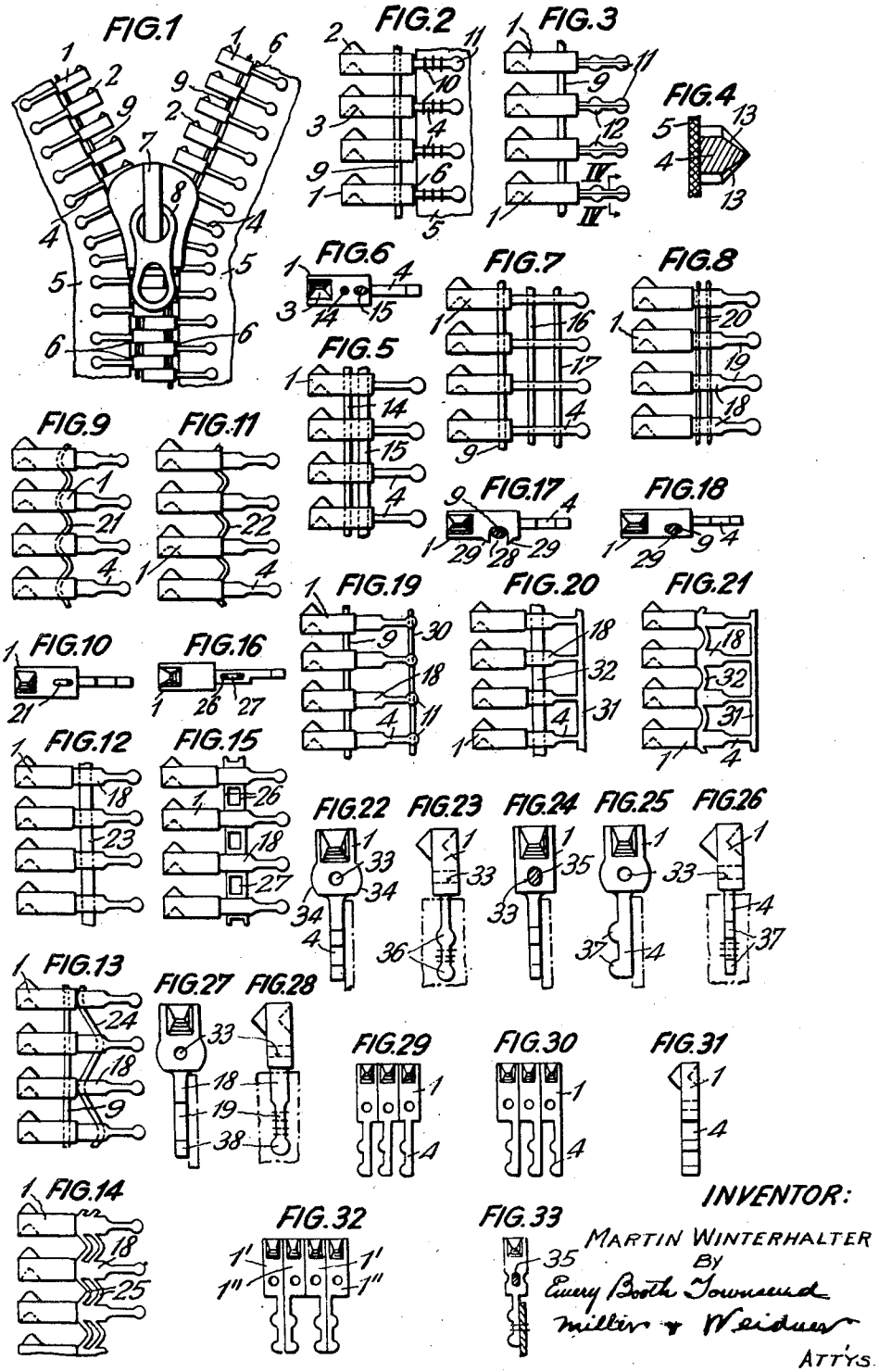
Feb. 7, 1950 M. WINTERHALTER 2,496,925

SEPARABLE FASTENER

Original Filed March 25, 1943 2 Sheets-Sheet 1



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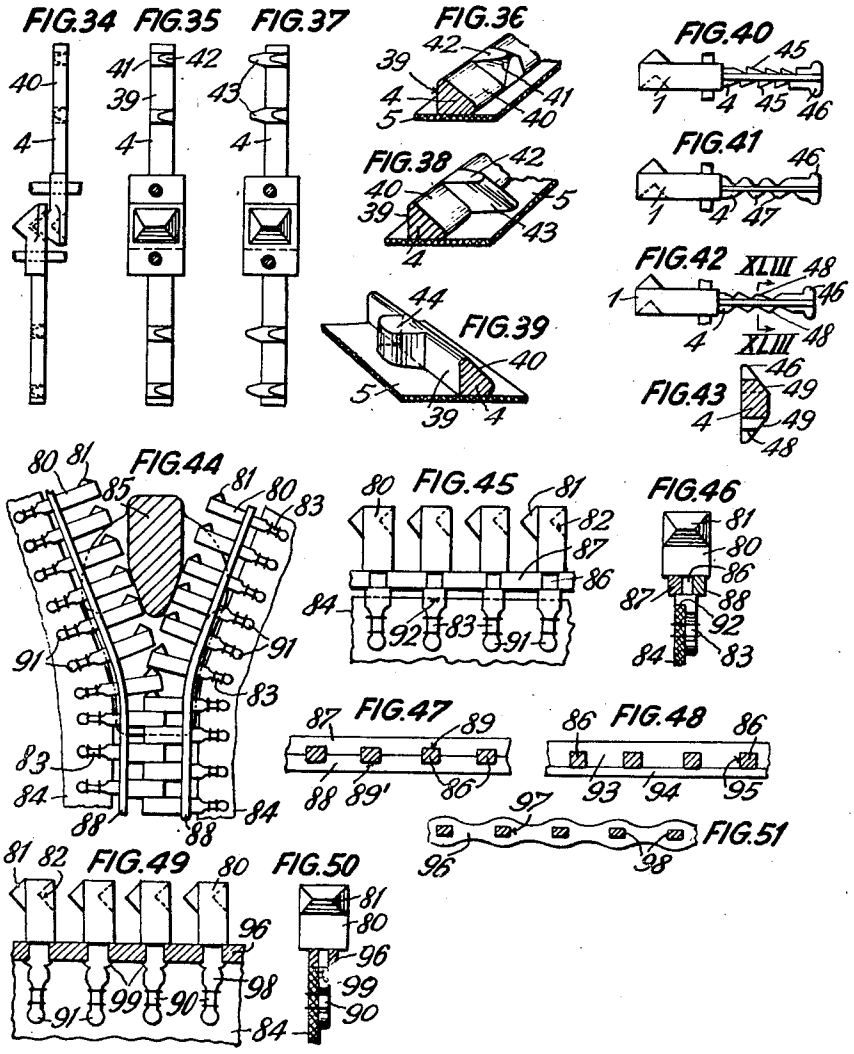

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SEPARABLE FASTENER

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Original application March 25, 1943, Serial No. 480,463, now Patent No. 2,380,623, dated July 31, 1945. Divided and this application May 12, 1945, Serial No. 593,351. In Switzerland March 30, 1942

4 Claims. (Cl. 24—205.16)

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This invention relates to separable fasteners which can be made of metallic or non-metallic materials. The application is a division of my prior application Ser. No. 480,463, filed March 25, 1943, now Patent 2,380,623, dated July 31, 1945.

An object of the invention is the provision of a separable fastener of the slide fastener type having fastener elements provided with interlocking heads, said fastener elements being attached directly to the article which is to be provided with the fastener, without first clamping the elements to the usual fabric tapes by means of which the fastener stringers are formed.

According to the invention the interlocking heads of the fastener elements are provided with rigid studs forming an extension of the heads and by means of which the element is directly attached to the article to be provided with the separable fastener, the attaching means consisting of thread stitching passing over the studs. In order to enable the connection of the fastener elements to the article in correct and simple manner, the elements are first strung on a carrier consisting of rigid material but which owing to its shape or feeble cross sectional area is rendered flexible, so as to obtain fastener stringers having the required flexibility for the operation of the usual slider producing engagement and disengagement of the cooperating elements. The carrier can preferably consist of a thermoplastic material, such as high molecular condensation products, polyamides and the like, in the shape of threads, wires or bands, on which the fastener elements are longitudinally spaced. Such carrier threads can be obtained by drawing the material nearly to its limit of expansion, so that the threads do not expand any more and the fastener elements fixed thereon always keep their correct spacing, while in transverse direction these threads are extremely flexible to allow an easy displacement of the slider along the stringers.

The accompanying drawings show several forms of separable fasteners according to the present invention.

Fig. 1 is a fragmentary plan view of a separable fastener according to the invention.

Fig. 2 shows a fragment of a fastener stringer drawn to a larger scale.

Fig. 3 shows a modified stringer, while Fig. 4 is a section along the line IV—IV of Fig. 3.

Fig. 5 is a plan view and Fig. 6 a transverse section of a modified fastener stringer.

Figs. 7, 8 and 9 are plan views of further modifications of fastener stringers, while Fig. 10

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is a transverse section of the stringer according to Fig. 9.

Figs. 11, 12, 13 and 14 are plan views of further modifications of fastener stringers, and Fig. 16 is a transverse section through the stringer according to Fig. 15.

Figs. 17 and 18 are transverse sections through fastener stringers and illustrate a modified manner of attaching the fastener elements to the carrier.

Figs. 19, 20 and 21 are plan views of further modifications of fastener stringers.

Figs. 22, 23, 24, 25, 26, 27 and 28 show fastener elements in plan view and in lateral view and illustrate the manner of fixing the elements to a carrier.

Figs. 29, 30, 31, 32 and 33 show fastener elements of a separable fastener according to the invention which have been obtained by punching from a strip of sheet material.

Figs. 34 and 35 are a lateral view and a plan view of two interengaged fastener elements, while Fig. 36 shows a detail of the connecting stud of these elements.

Figs. 37 and 38 show fastener elements with modified connecting studs, and Fig. 39 is a detail view of a further modified connecting stud.

Figs. 40, 41 and 42 show further modifications of connecting studs of fastener elements, and Fig. 43 is a transverse section along the line XLIII—XLIII of Fig. 42.

Fig. 44 is a fragmentary view of a further modified fastener according to the invention.

Fig. 45 shows a fragmentary view of a fastener stringer.

Fig. 46 is a section view of the stringer according to Fig. 45.

Fig. 47 is a horizontal longitudinal section through the stringer on the level of the carrier of the fastener elements.

Fig. 48 is an analogous longitudinal section through a modified stringer.

Figs. 49 and 50 show a further modified stringer in longitudinal and in transverse section.

Fig. 51 is a horizontal longitudinal section of another example of a fastener stringer according to the invention.

Fig. 1 shows a portion of a separable fastener according to the invention having fastener elements which are directly attached to the edge portions along an opening of an article, for example of a piece of clothing which is to be provided with the fastener. Fig. 2 shows a portion of the fastener stringer of this fastener. The fastener elements have a head portion 1 pro-

vided at the front end with the usual interlocking projection 2 and the socket 3. At the rear end of the head portion 1 each element is formed with a rigid connecting stud 4 which serves for directly attaching the fastener element to the edge portion of a piece of clothing or any other article 5 of fabric, leather, etc. The cross sectional area of the connecting stud 4 is smaller than that of the head portion 1 so that a shoulder 6 is formed between the head portion and the connecting stud, which shoulder serves to guide the usual slider 7 provided with a pull tab 8. The various fastener elements are spaced longitudinally on a carrier 9 of thread or wire shape. The material of this carrier is resiliently flexible but not expansible. For example the carrier can be formed from a thread of polyamide; also other synthetic products of the group of high molecular polycondensation products or other thermoplastic materials can be used. For example, the fastener elements are directly die-cast on the carrier or pressed upon the latter. They can consist of metal such as cast zinc, or of thermoplastic material, for example of the same material as the carrier 9. The flexible fastener stringer thus formed by the carrier and by the fastener elements fixed thereon is attached to the article 5 by means of the connecting studs 4 of the fastener elements. As shown, the stringer is placed with the connecting studs upon the edge portion of the article and then sewing stitches 10 are passed over the studs to fix them to the article. The studs 4 are provided with an enlargement or head 11 at their ends, so that they can not be pulled out of the stitches 10. The resiliently flexible carrier 9 maintains the fastener elements at their correct mutual distance and the stringer is flexible in its longitudinal plane so that an easy engagement and disengagement of the cooperating elements and a smooth run of the slider is obtained.

In the example according to Figs. 3 and 4 the connecting studs 4 of the head portions 1 have a roof-shaped triangular cross section. For sewing the stringer to the fabric 5, the stringer is placed on the fabric with the base of the connecting studs on the surface of the fabric and then the studs are attached to the fabric by means of a sewing machine, the stitches passing between the enlargements 11 and 12 of the studs. When the sewing needle arrives on top of a connecting stud it can slide downwardly the inclined surfaces 13 of the stud and does not break.

In the example according to Figs. 5 and 6 the carrier of the fastener elements is formed by two threads 14 and 15 of synthetic material on which the fastener elements are die-cast. This modification is advantageous for greater models of fasteners. The thread 14 is of circular cross section and the thread 15 of oval cross section; obviously the cross sectional area of those threads can have any other shape.

In the example according to Fig. 7 the connecting studs 4 are longer than those shown in the previous examples. Besides the carrier thread 9 traversing the fastener elements 1, the connecting studs 4 are also traversed by parallel threads 16 and 17. All threads are flexible so as to impart the required flexibility to the stringer.

According to Fig. 8 the connecting stud of the fastener elements 1 is composed of a wider portion 18 situated adjacent the interlocking head portion 1 and of a narrower end portion 19. The wider portion 18 is traversed by two carrier threads 20, while the narrower portion 19 of the

studs serves to attach the stringer to the article by means of stitches passing over this portion.

In Figs. 9 and 10 the thread or wire 21 forming the carrier of the fastener elements is undulated. This thread can be formed from a high molecular polycondensation product or from a steel wire.

According to Fig. 11 the carrier of the fastener elements 1 is formed by curved webs 22 which are die-cast in one piece with the fastener elements 1 and the connecting studs 4.

In the example according to Fig. 12 the flexible carrier 23 of the fastener elements 1 is formed as strip and traverses the wider portions 18 of the connecting studs.

In Fig. 13 the fastener elements 1 and the wider portions 18 of the connecting studs are die-cast on an undulated wire 24 and on a thread 9. Both threads or wires 9 and 24 can consist of polyamide or the thread 24 can also consist of steel.

In Fig. 14 the carrier of the fastener elements 1 is formed by two curved webs 25 extending between the wider portions 18 of the connecting studs. The complete stringer formed by the interlocking head portions, the connecting studs and the webs is cast in a single piece.

In the example according to Figs. 15 and 16 the carrier of the fastener elements 1 is formed by two parallel webs 26 which are cast in a single piece with the wider portion 18 of the connecting studs of the fastener elements. The fastener elements could also be die-cast on a band-shaped carrier in which flexible webs 26 are formed by providing recesses 27. Instead of disposing the carrier 26 between the connecting studs as represented, the carrier could also be arranged between successive fastener elements 1.

In the example according to Figs. 17 and 18 the head portion 1 of the fastener element is provided at one side with a groove 28 into which the carrier thread 9 can be inserted. Laterally of the groove 28 the material of the fastener elements forms projections 29 which, after insertion of the thread into the groove, are bent or pressed inwardly in order to close the groove and to press the fastener element firmly on the thread. The groove 28 could also be provided on the connecting stud 4. The fastener element with the connecting stud in this example can be cast or punched out from sheet material. If desired, in the example according to Figs. 9, 10 and 13, the undulated thread or wire 21 or 24 could also be inserted in a corresponding groove in the head portion or in the connecting stud. In this case the undulated or zigzag-shaped carrier and the fastener elements can be produced independently one from the other, and the carrier can be subsequently inserted into the groove of the elements while in the other case the fastener elements must be die-cast on the carrier.

In the example according to Fig. 19 the fastener elements 1 are fixed to a carrier 9 and a further thread 30 traverses the enlarged rear end of the connecting studs 4. The fastener elements and connecting studs are either die-cast on the threads 9 and 30, or the threads are subsequently inserted through corresponding holes in these portions.

In Fig. 20 the rear end of the connecting studs 4 are connected to each other by webs 31 cast in one piece with the fastener elements, and the wider portions 18 of the connecting studs are traversed by a band-shaped carrier 32.

In Fig. 21 the rear end of the connecting studs 4 are connected by webs 31 and the thicker por-

tion 18 of the connecting studs are connected by curved webs 32. The head portions 1, the connecting studs 4 and the webs 31 and 32 may be cast in a single piece.

In the examples according to Figs. 22 to 28 the head portion 1 of the fastener elements is provided with a central opening 33 which is obtained when producing the fastener elements by casting or by punching. On the level of the opening 33 opposite sides of the fastener element are provided with bulged portions 34. The fastener elements are threaded by means of their opening 33 to a string of polyamide or the like, and correctly spaced thereon and afterwards pressure is applied to the bulged portions of the elements so that the side faces of the elements become flat as shown in Fig. 24 and the thread 35 is fixed by pressure in the opening 33. In order to attach the stringer to a piece of fabric or any other article the connecting studs 4 are sewn to the fabric. In order to prevent a sliding movement of the attached fastener elements the connecting studs 4 are formed with enlargements 36 or 37 between which the sewing stitches pass over the studs. In Figs. 27 and 28 the connecting stud is formed with a wider portion 18 and with a norrower portion 19 having a head 38 at its end.

Figs. 29 to 33 show fastener elements provided with connecting studs according to the invention and which are obtained by punching the elements out of sheet material. According to Fig. 29 the connecting studs 4 are disposed according to the median axis of the head portion 1, while according to Fig. 30 the connecting studs 4 are disposed laterally on the head portion 1. According to Fig. 32 the fastener elements are punched out from a strip of sheet material in such manner that one fastener element 1' belongs to one stringer of a cooperating pair of separable fastener stringers while the next following fastener element 1'' belongs to the second stringer of the pair. The openings 33 for the insertion of the carrier thread are punched out simultaneously with the fastener elements. Fig. 33 shows the fastener element fixed on the carrier thread 35 by means of pressure applied to opposed sides of the element at the height of the carrier.

Figs. 34 to 39 show particular constructions of connecting studs for the fastener elements. The connecting stud 4 is of triangular cross section, one face 39 of the stud extending at right angles to the piece of cloth to which the stud is to be fixed, while the face 40 is inclined relatively to the surface of the cloth. In the example according to Figs. 34 to 36 the studs 4 are provided on the side of the inclined surface 40 with two spaced enlargements 41 between which can pass the sewing stitches for attaching the fastener element to an article. The upper side of the enlargements 41 is provided with a plane face 42 extending flush with the upper edge of the connecting stud and serving to guide the pressure foot of the sewing machine which is used to sew the connecting studs to an article 5.

In the example according to Figs. 37 and 38 the enlargements 43 project laterally from the inclined surface 40 and form again an upper plane face 42.

According to Fig. 39 the enlargements 44 project from the vertical face 39 of the studs and also form an upper plane face 44 flush with the upper edge of the stud.

According to Fig. 40 the connecting studs 4 of the fastener elements 1 are provided with indented edges 45. The indentations at opposite edges are longitudinally displaced one relatively to the other so that the cross sectional area of the stud does not become too weak. In Fig. 41 the opposite edges of the connecting stud 4 are undulated and in Fig. 42 the edges have zigzag-shape. As shown in Fig. 43 the upper side of the connecting studs 4 is formed with inclined surfaces 49 extending also over the enlarged end 46 of the studs.

In the example according to Figs. 44 to 47 the fastener elements 80 are provided with the usual coupling projection 81 and with the socket 82. The fastener elements are provided with a connecting stud 83 by means of which the elements are attached to a piece of clothing or other article 84. 85 represents the usual slider by means of which the cooperating stringers are engaged and disengaged.

The connecting studs 83 are provided with a portion 86 of reduced cross section so as to form a circular groove on the connecting studs, into which the band-shaped carrier of the elements is inserted. The carrier according to Fig. 47 is formed by two separate strips 87 and 88 which are provided with recesses 89 and 89' which, when the two strips are joined, form openings in the carrier to receive the reduced portions 86 of the connecting studs. The studs are engaged with their portions 86 into the recesses of one of the strips 87 or 88 before the two strips are joined and then the second strip is joined to the first one and the two strips are fixed together by means of an adhesive or by soldering or welding. The fastener elements 80 are thus firmly connected with the carrier and a stringer is formed which can be directly attached to a piece of fabric or leather etc. In the represented example the stringer is attached to the fabric by sewing, the stitches passing over a reduced portion of the connecting studs which are provided with a head 91 at their end so that they cannot be pulled out of the stitches. The studs 83 are provided with a shoulder 92 against which abuts the edge of the article to which the stringer is attached.

The carrier 87, 88 is formed of rigid material of such cross sectional area that it is flexible in the plane of the stringer. The carrier can be made of thermoplastic material, particularly of high molecular condensation products, such as polyamide and the like. The fastener elements 80 can be made of metal, for instance of die-cast zink or also of thermoplastic material.

In the modification according to Fig. 48 the carrier of the fastener elements is formed by a wider strip 93 and by narrower strip 94. The wider strip 93 is provided with recesses 95 into which the reduced portions 85 of the connecting studs are inserted. After insertion of these portions into the recesses 95, the narrower strip 94 is joined to the strip 93 and firmly connected with this strip so that the fastener elements are permanently secured to the carrier.

In the example according to Figs. 49 to 51 the fastener elements 80 are carried by a strip 96 which is provided with openings 97 through which the studs 98 are inserted.

As shown in Fig. 49 the studs 98 are inserted through the holes of the carrier and then a portion of the material of the studs is riveted at the rear side of the carrier. The studs could be secured to the carrier also by means of an adhesive or by soldering or welding. The fastener stringer can then be attached to the article 84 by sewing, of the connecting studs 98, the stitches passing over a portion 99 of reduced width.

While I have shown and described a number of embodiments which my invention may assume in practice, it will be understood that variations may be made in the configuration and combination of the several parts without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. A stringer forming one complementary part of a slide operated separable fastener, which stringer comprises a row of fastener elements having elongated heads formed adjacent one of their ends with opposite projections and recesses for releasable interlocking engagement with the recesses and projections, respectively, of the other complementary stringer of the fastener, and formed at their opposite ends to present slider guide surfaces; said heads being severally fixedly mounted and supported at portions thereof between their slider guide surfaces and projections and recesses, and with the heads in spaced out of contact relation, on a wire-like, bendable, substantially non-extensible carrier member extending through and confined to such portions; each fastener element comprising an elongated stud integrally carried by and projecting from that end of the head portion thereof which presents the slider guide surface, which elongated stud has a flat side adapted to lie against the side of an article to which the stringer is to be attached and to be secured thereto with stitches, said stud having an opposite side which is bevelled transversely thereof for deflecting the needle forming such stitches, the studs of the fastener elements also being in spaced out of contact relation.

2. A stringer according to claim 1 in which each stud is formed with spaced shoulders adapted to prevent disengagement of the stud from stitches which pass over the stud for securing it to the article.

3. A stringer according to claim 1 in which said flat side is joined to said opposite bevelled side by straight parallel walls.

4. A stringer according to claim 1 in which an auxiliary wire-like bendable but substantially non-extensible carrier member is provided, which carrier member extends longitudinally of the stringer and is confined to and connects the otherwise free end portions of the studs.

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REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
D. 34,893	Beopple	Aug. 6, 1901
1,581,751	Marinsky	Apr. 20, 1926
2,067,734	Silberman	Jan. 12, 1937
2,067,735	Silberman	Jan. 12, 1937
2,380,623	Winterhalter	July 31, 1945

FOREIGN PATENTS

Number	Country	Date
476,175	Great Britain	Dec. 2, 1937