Oct. 23, 1956 G. A. PARSONS 2,767,566

LATCH NEEDLE PIVOT

Filed Jan. 25, 1955

2 Sheets-Sheet 1

FIG. 1

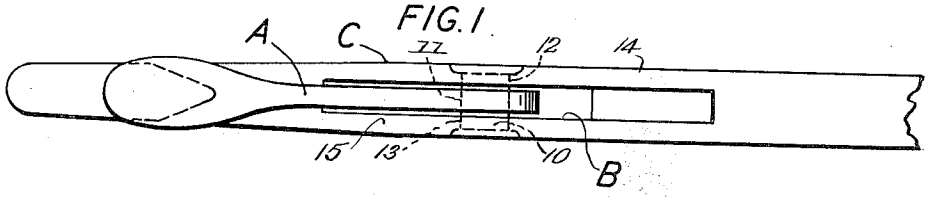


FIG. 2

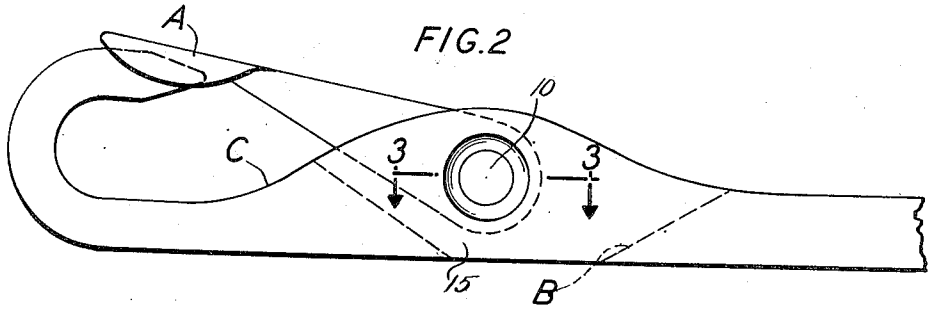


FIG. 3

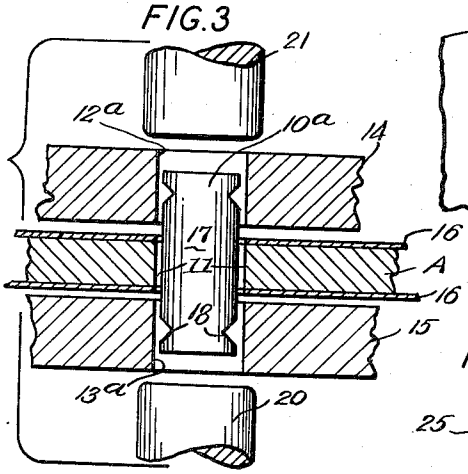


FIG. 5

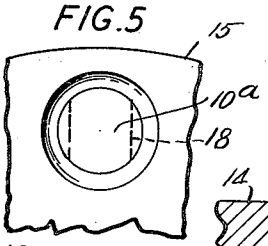


FIG. 4

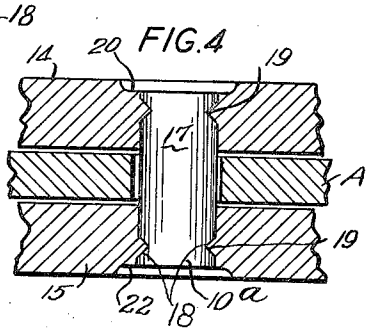


FIG. 8

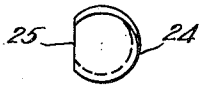


FIG. 6

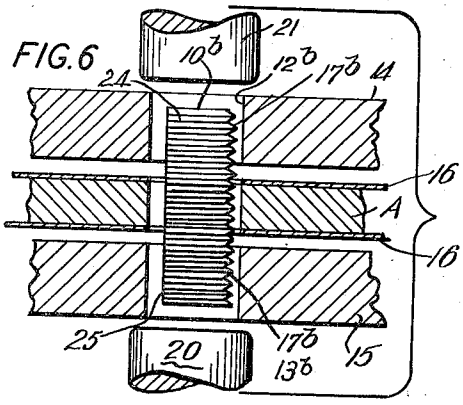
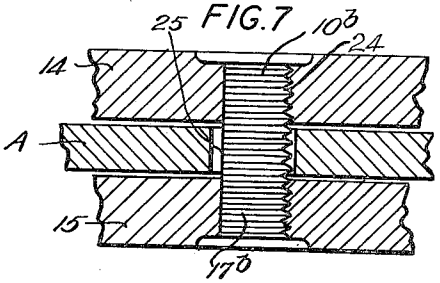


FIG. 7



INVENTOR
GEORGE A. PARSONS
BY Dike, Thompson & Sunborn
ATT'YS.

Oct. 23, 1956 G. A. PARSONS 2,767,566

LATCH NEEDLE PIVOT

Filed Jan. 25, 1955

2 Sheets-Sheet 2

FIG. 9

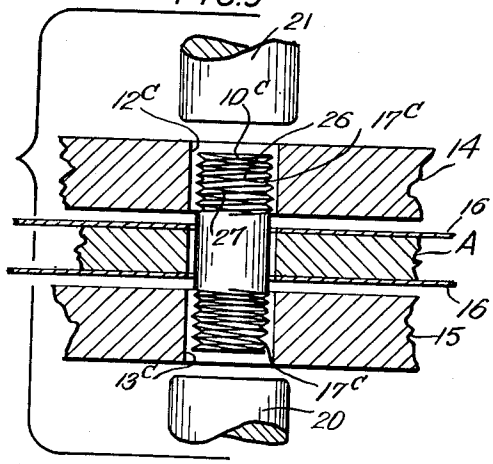


FIG. 10

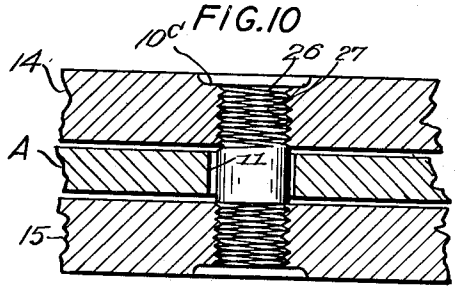


FIG. 11

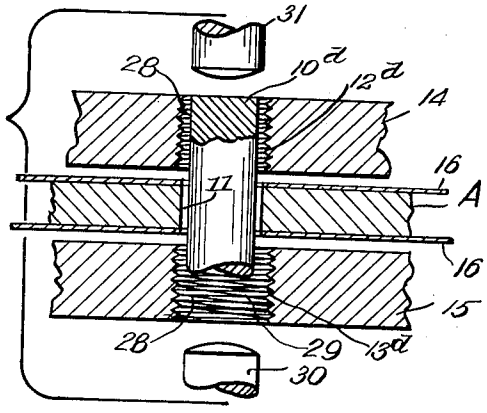


FIG. 12

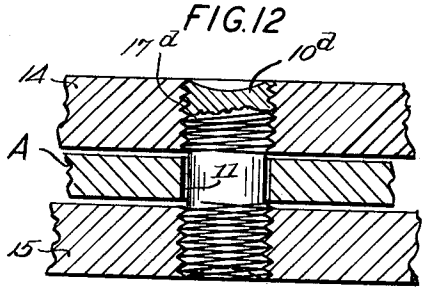


FIG. 13

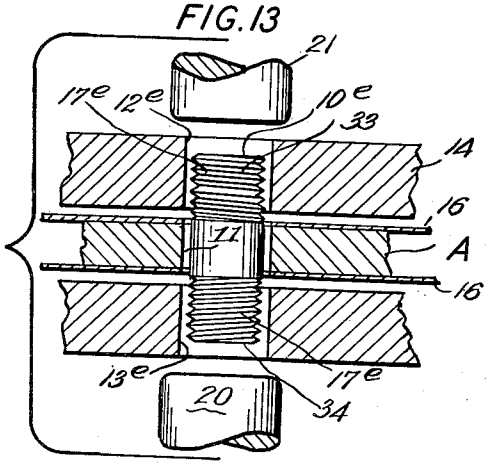
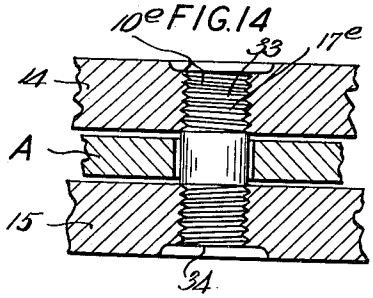


FIG. 14



INVENTOR
GEORGE A. PARSONS
BY Dike, Thompson & Sanborn
ATT'YS.

United States Patent Office 2,767,566
Patented Oct. 23, 1956

2,767,566

LATCH NEEDLE PIVOT

George A. Parsons, Marlboro, Mass.

Application January 25, 1955, Serial No. 483,890

8 Claims. (Cl. 66—122)

The present invention relates to knitting machine latch needles. More particularly it relates to an improvement in the pivot on which the latch swings and to a method of securing a pivot pin in the body of the needle.

In practice the first sign of wear on the needle is generally at the pivot and it is damaged at the pivot which is a primary cause for which latch needles must be replaced. Therefore, there has been a continuous search to find better types of pivots.

In common types of latch needles the latch is swingably mounted between the cheeks of the needle which are walls of a slot in the body of the needle. In most latch needles in use at present the latch is swingably mounted on one of three general types of pivots. For purposes of description these three types may be designated the screw type, the smooth type and the pressed type.

The screw type and the smooth type pivot are both pins which are passed through a hole in the latch. The ends of these pins extend through holes in the cheeks of the needle where their outward ends are headed over and ground flush with the outsides of the cheeks.

If these pins loosen their outward ends may slip out beyond the surface of the cheeks and fracture or fray the yarn as the needle passes through. Also if the pins turn in the holes in the cheeks the headed over ends of the pins become unseated which can cause roughness which will fracture or fray the yarn.

Each knitting stroke of the needle swings the latch back and forth on the pivot pin and subjects it to torsional stress, first in one direction and then in the opposite direction in rapid succession. Therefore the useful life of the needle is largely determined by how well the pivot pin resists loosening under this severe torsional stress.

With the screw and smooth type pivots the ends are headed over to tighten the fit in the hole but merely holding the pin tightly has proved insufficient to resist torsional stress for long.

In some needles the ends of the pins are headed over in irregular countersinks in the cheeks to provide added resistance. This helps some until the headed over ends which are outside of the needle become worn down by the constant friction as the needle slides through the yarn and in and out of the channels in which the needle is mounted.

The screw type pivot pin is distinguished from the smooth type by being threaded through the cheeks of the needle. The threads provide added resistance to the torsional stress in one direction, but not in the other. However, if the screw type pivot becomes loose the torsional stress will screw it out beyond a cheek of needle where it will rip the yarn. The smooth type pivot is a pin or rivet having a smooth surface.

The third general type of pivot mentioned above is the pressed type in which hubs pressed from the cheeks extend into the hole in the latch to form the pivot. This type has the advantage of not having any pin to be loosened by the torsional stress. Also there is no problem

of wear on the ends of the pivot because pressure hubs inward leaves depressions in the outside surfaces of the cheeks. However, no commercially practical means has been devised to fasten the two hubs together. Hence, the cheeks can bow outward and draw the hubs apart, so that the latch flies out.

The present invention provides a pivot pin which is secured in holes in the cheeks of the needle by means which enable it to resist being displaced by torsional stress in both directions more effectively and for a much longer period of use than have previous pivot pins—particularly the common screw and smooth types described above. The pivot of the present invention also prevents the cheeks of the needle from bowing in or out and thereby overcomes the weaknesses described with reference to the pressed type of pivots.

In addition the means by which the pivot pin of the present invention is secured in the cheeks of the needle is operative at the interface between the hole and the pin. That is, the securing means engages the outside diameter of the pin with the inside diameter of the hole below the outer surfaces of the cheeks. The means securing the pin is thus unaffected by surface wear on the needle in contradistinction to previous types of securing means such as heading over the ends of the pin with which the headed over portions of the pin are at the outer surfaces of the cheeks and are thus subject to being worn off.

Moreover, the outward ends of the pivot pin of the present invention are below the outer surfaces of the cheeks. This not only eliminates the possibility of the ends of the pin causing roughness on surfaces which come in contact with the yarn but also eliminates the necessity for grinding the ends of the pin after the pin is secured. By thus eliminating the grinding step the cost of manufacture is reduced below the cost of manufacturing needles with screw and smooth type pivots, since the number and expense of the other steps in manufacturing latch needles with the pivot of the present invention are substantially the same as with pivots of the screw and smooth types.

Therefore, a latch needle embodying the present invention lasts longer in use than needles having previous types of pivots and is also more economical to manufacture.

According to the present invention the ends of a pivot pin are secured in holes through the cheeks of the needle. To secure the pin, one of the surfaces (the inside diameter of the holes or the outside diameter of the pin) which will be at the interface between the holes and the pin is provided with a pre-formed recessed portion. The recessed portion is formed so as to have surfaces transverse to any relative movement of the pin in its hole. That is, surfaces of the recessed portion are across the paths of longitudinal and rotational movement of the pin in either direction including the movement of screwing or unscrewing the pin relative to the holes.

Then with the pin positioned in its hole, the material of the part adjacent the recessed surface is deformed by exerting a compressive force which swages or flows the material to embed it in the recessed portion of the corresponding adjacent surface. Thus, the two cylindrical surfaces are firmly mated so as to be immovably locked together. Also incident to the swaging or flowing operation, the outward ends of the pin are pressed below the outward surfaces of the cheeks of the needle and thus they need not be ground to make them absolutely smooth.

Further objects and advantages of the present invention will be apparent from the following description and accompanying drawings in which:

Fig. 1 is an enlarged top plan view of a knitting machine latch needle of a type in which the latch is swingably secured in a slot in the body of the needle by a pivot

pin which extends through the latch and is secured in the cheeks.

Fig. 2 is a side elevation of the latch needle of Fig. 1.

Fig. 3 is an enlarged exploded section on the line 3—3 of Fig. 2, showing a pivot pin in top plan and in position to be secured in the cheeks of the needle according to the present invention.

Fig. 4 is a view similar to Fig. 3 but showing the pivot pin after it has been secured according to the present invention.

Fig. 5 is a side elevation of part of the needle of Fig. 4 showing the pivot pin in end elevation.

Fig. 6 is a view similar to Fig. 3 but showing a second form of pivot pin and hole as a further illustration of the present invention and showing them before the pin is secured.

Fig. 7 is a view similar to Fig. 6 showing the pivot pin of Fig. 6 secured.

Fig. 8 is an end elevation of the pivot pin of Fig. 6.

Fig. 9 is a view similar to Fig. 3 but showing a third form of pivot pin and hole as another illustration of the present invention and showing them before the pin is secured.

Fig. 10 is a view similar to Fig. 9 showing the pivot pin of Fig. 9 secured.

Fig. 11 is a view similar to Fig. 3 but showing a fourth form of pivot pin and hole as a further illustration of the present invention and showing them before the pin is secured and with the pivot pin shown partly in section and partly broken away.

Fig. 12 is a view similar to Fig. 11 showing the pivot pin of Fig. 11 secured.

Fig. 13 is a view similar to Fig. 3 but showing a fifth form of the pivot pin and hole as still another illustration of the present invention and showing them before the pivot pin is secured; and

Fig. 14 is a view similar to Fig. 13 showing the pivot pin of Fig. 13 secured.

Referring to Figs. 1 and 2 of the drawings, in a common type of knitting machine latch needle a latch A is swingably secured in a slot B in the body of the needle C by a pivot pin **10**. The pivot pin **10** extends through a hole **11** in latch A and the ends of the pin are secured in holes **12** and **13** in the cheeks **14** and **15**, which are the side walls of the slot B.

The present invention is the means and method by which the ends of the pivot pin **10** are secured in the holes **12** and **13**. Five embodiments of the invention are described below to illustrate the invention.

In the first embodiment shown in Figs. 3, 4 and 5, the portions **17** of a pin **10***a* which are received in holes **12***a* and **13***a* are recessed with notches **18**. The notches **18** are in the external cylindrical surfaces inwardly from the ends of the pin and each notch extends only part way around the interface and only part way between the ends of the interface.

The inside cylindrical surface of the hole **12***a* and **13***a* is smooth and the sizes of the hole and of the pin **10***a* are such that the notched pin is fitted into position in the holes without obliterating the notches.

To secure the pin **10***a* in the holes **12***a* and **13***a*, the walls of the holes are forced against the portion **17** of the pin until the wall surfaces of the holes flow into and become embedded in the notches **18**, as indicated at **19** in Fig. 4. This is done by laying the body C of the needle across an anvil **20** so that portions of the anvil are against the outside of the cheek **15** adjacent the hole **13***a*. Then a tool such as a die **21** is pressed against the outside of the opposite cheek **14** adjacent the hole **12***a* and pressed until the walls of the holes flow to the position indicated in Fig. 4.

In order to keep the cheeks **14** and **15** from being pressed in and binding against the latch A during this operation, paper **16** is inserted between the sides of the latch and the cheeks **14** and **15**. After the pin is secured the paper is burned out to leave room for the latch to swing freely.

In practice the pin **10***a* is made slightly shorter than the distance through the holes **12***a* and **13***a* and is positioned in the holes so that the ends of the pin are below the outer surfaces of the body. In addition, the face surfaces of the anvil **20** and the die **21** cover an area larger than the end of the hole **13** and form depressions **22** in the outer surfaces of the cheeks **14** and **15**. Thus the ends of the pin **10***a* and the edges of the holes **12***a* and **13***a* are below the outside surfaces of the cheeks and are out of contact with the yarn during knitting so that it is not necessary to grind them to make them absolutely smooth.

It will be noticed that a notch, such as one of the notches **18**, has surfaces traversing the direction of relative movement of the pin **10***a* and holes **12***a* and **13***a* in any direction. Then, when the opposite surface at the interface is embedded in the notch, the two surfaces at the interface are firmly locked together and resist movement relative to each other in any direction.

The essence of the present invention is thus the preformation of a recessed portion, such as the notch **18** spaced inwardly from the ends of the pin in one of the corresponding cylindrical surfaces of the pivot pin **10** and its hole and then deforming the opposite surface against and into the recessed portion to embed the opposite surface, thereby locking the surfaces together.

It will be appreciated that it is not material to the present invention which surface at the interface is recessed so long as the surfaces are pressed together to embed the opposite surface in the recessed portion.

If the malleability of the pin and the body of the needle are about the same and a surface of one of them is flowed against a surface of the other, the material of the flowing surface is more plastic and becomes embedded in the recessed portion in the surface against which it is flowed without substantially altering the character of the recessed portion. If the malleability of the pin and the body of the needle are considerably different, it will prove most satisfactory to recess the surface of the less malleable member and deform into it the surface of the more malleable member.

In Figs. 6, 7 and 8, which show another illustration of the present invention, a second form of pivot pin, **10***b*, is received in smoothly bored holes **12***b* and **13***b* in the cheeks **14** and **15**. The surface of the pivot pin **10***b* is deformed by circular grooves or threads **24** and at least one side of the pin is flattened or slabbed off to provide a flat surface **25** interrupting the grooves **24**. The grooves **24** may extend over the entire length of the pin for convenience in manufacturing but they are only required at the portions **17***b* at the ends of the pin which are received in the holes **12***b* and **13***b*.

The pin **10***b* is secured in the holes **12***b* and **13***b* in the same manner as described with reference to Figs. 3 and 4, that is, the anvil **20** and die **21** are applied to press the cheeks **14** and **15** of the needle C so that the wall surfaces of the holes are forced against the recessed surfaces of the pin **10***b* to become embedded in the recesses, as shown in Fig. 7.

Looking at Fig. 7 it will be seen that the circular grooves **24** prevent longitudinal movement of the pin and the flat surfaces **25** prevent rotation.

Referring to Figs. 9 and 10, in a third illustration portions **17***c* of pivot pin **10***c* are received in holes **12***c* and **13***c* and are recessed with oppositely sloping threads **26** and **27** which cross each other. These threads, which are shown as being screw threads, do not perform the usual function of screw threads. Thus they may be any type of oppositely sloping grooves or ridges, but screw threading the pin successively in opposite directions is a simple way of forming them.

When in position in the holes **12***c* and **13***c*, which are shown as being smoothly bored holes, the pin **10***c* is se-

cured in the same manner as in the previous two illustrations by flowing the walls of the holes against the pin, using the anvil 20 and die 21.

When the pin 10*c* is secured as shown in Fig. 10, the walls of the holes 12*c* and 13*c* being embedded in the threads 26 and 27, the pin is held against movement in any direction.

Figs. 11 and 12 further illustrate the use of oppositely sloping threads to provide a recessed portion according to the present invention, but in this instance a pivot pin 10*d* is shown as being a smooth pin and the oppositely sloping threads, which are designated 28 and 29, are formed in the walls of holes 12*d* and 13*d*. This may be done by tapping the holes alternately with right and left-hand threads.

The pin 10*d* is secured in the cross tapped holes 12*d* and 13*d* by applying an anvil 30 and a die 31 to the respective ends of the pin and pressing the ends of the pin until the portions 17*d* of the pin, which are in the holes, bulge out and become embedded in the threads 28 and 29 as indicated in Fig. 12.

It will thus be appreciated that a recessed portion meeting the previously described requirements of the present invention may be formed in either corresponding cylindrical surface of the hole and the pin without departing from the spirit of the present invention.

Referring now to Figs. 13 and 14, the fifth embodiment illustrating the present invention comprises a pivot pin 10*e* in which a set of screw threads 33 sloping in one direction is formed in the portion 17*e* of the pin which is received in the hole 12*e* in the cheek 14 and another set of screw threads 34 sloping in the opposite direction is formed in the portion 17*e* received in the hole 13*e* in the cheek 15.

With the pin 10*e* in position the anvil 20 and die 21 are applied in the same manner described with reference to the first example of Figs. 3 and 4 to press the cheeks adjacent the holes 13*e* and 12*e* until the walls of the holes become embedded in the threads 33 and 34.

When the pivot pin 10*e* is thus secured (Fig. 14) the threads 33 and 34 sloping in opposite directions on different portions of the pin have a turnbuckle effect and prevent movement of the pin in any direction. The threads 33 and 34 could both be formed at different places on one of the portions 17*e* of the pin in one of the holes 12*e* or 13*e* and have the same effect, but pivot pins are quite small and the illustrated arrangement has proved the easiest to form.

The above description is of several embodiments of the present invention for the purpose of illustrating it clearly. It will be appreciated, however, that certain departures from the structures and methods described may be made without departing from the scope of the invention set forth in the appended claims.

I claim:

1. A knitting machine latch needle comprising in combination a body member having a slot therein and forming two cheeks having aligned holes extending through both cheeks, said holes including internal generally cylindrical surfaces, a latch received in said slot, and a pin

on which the latch is pivotally mounted, said pin having a continuous external generally cylindrical surface extending into each said hole adjacent one of said internal surfaces, at least one of said adjacent surfaces having a pre-formed recessed portion at a point which is spaced inwardly from the ends of the said one internal generally cylindrical surface, said recessed portion including abutting surfaces which are transverse both to rotational and longitudinal movement of the pin in the hole, the other said adjacent surface being deformed and thereby embedded into said recessed portion.

2. A knitting machine latch needle according to claim 1 in which said recessed portion comprises a notch extending part way around said one of said adjacent surfaces.

3. A knitting machine latch needle according to claim 1 in which said recessed portion comprises circular grooves and a substantially flat portion interrupting said grooves.

4. A knitting machine latch needle according to claim 1 in which said recessed portion comprises oppositely sloping threads.

5. A knitting machine latch needle as set forth in claim 1 in which said recessed portion includes a set of threads sloping in one direction and another set of threads slopping in the opposite direction.

6. In the fabrication of a latch needle, the method of securing between the cheeks of the needle body a latch pivot pin having an external cylindrical surface which comprises forming in the said cheeks a pair of aligned holes having internal cylindrical surfaces capable of closely receiving the external cylindrical surface of the pin, forming in one of said cylindrical surfaces a recessed portion having surfaces which are transverse both to rotational and axial movement of the pin in the holes and at a point which, when the parts are assembled, is inwardly spaced from the ends of one of the holes, and applying in a direction axially of the holes a compressive force against the material of the part which is adjacent the part having the recessed portion sufficient to flow the said material into said recessed portion.

7. In the method as set forth in claim 6, forming the recessed portion in the internal cylindrical surface of one of the holes, and applying said compressive force against the pin thereby embedding the material of the pin in the said recessed portion.

8. In the method as set forth in claim 6, forming the recessed portion in the external cylindrical surface of the pin, and applying said compressive force against the cheeks of the needle body adjacent the pin thereby embedding the material of the cheeks in said recessed portion.

References Cited in the file of this patent

UNITED STATES PATENTS

600,692	Huke et al.	Mar. 15, 1898
757,708	Woodward	Apr. 19, 1904
1,070,834	Nissen	Aug. 19, 1913

FOREIGN PATENTS

711,841	Great Britain	July 14, 1954