

Sept. 21, 1954

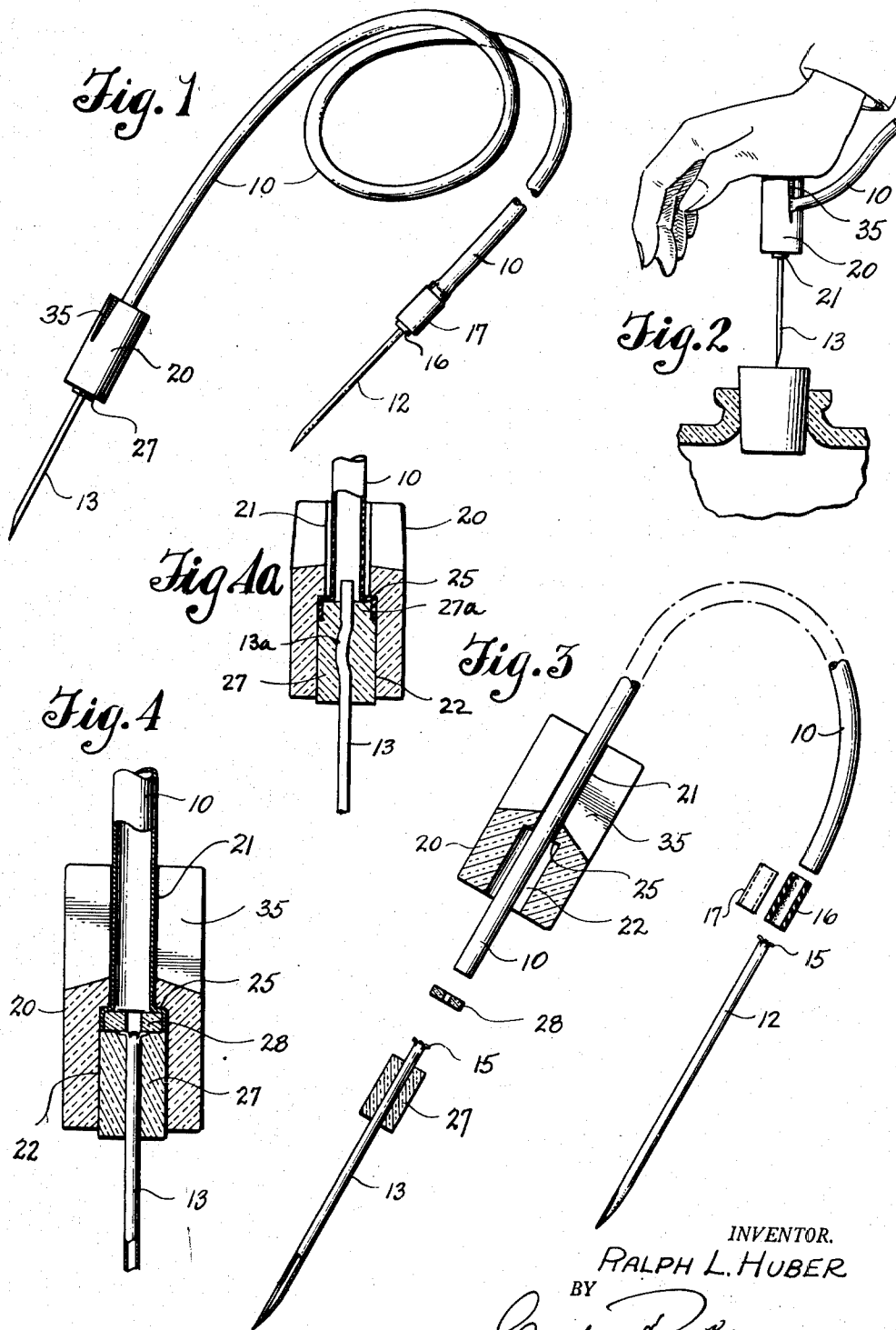
R. L. HUBER

2,689,563

DONOR SET

Filed Nov. 6, 1951

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 5

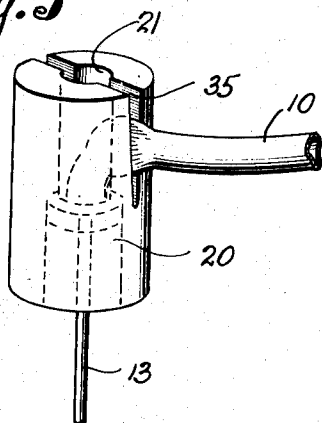


Fig. 6

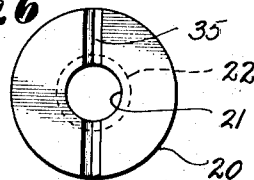


Fig. 7

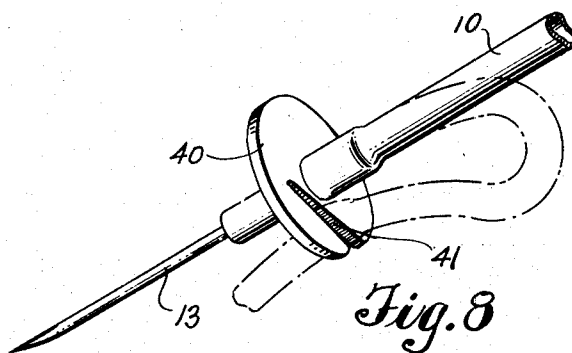
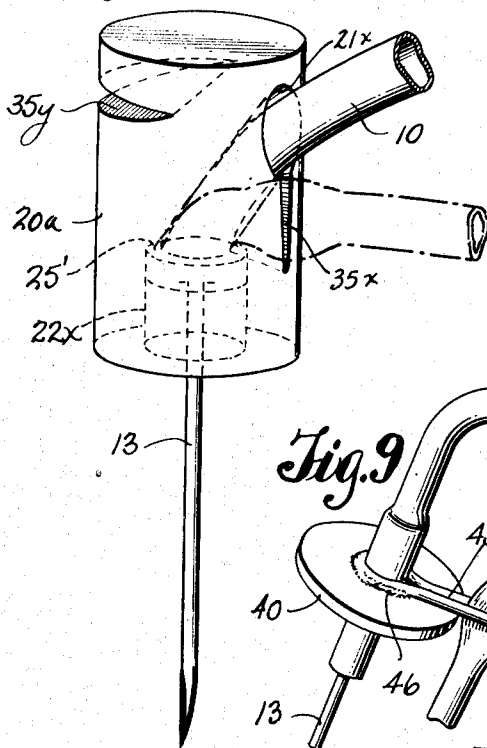


Fig. 8

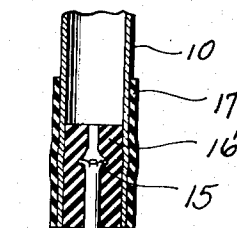


Fig. 10

Fig. 9

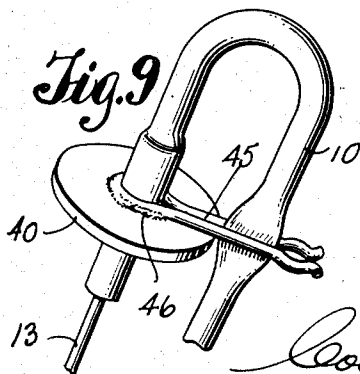
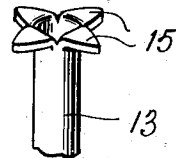


Fig. 11



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DONOR SET

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10 Claims. (Cl. 128—214)

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This invention relates to improvements in what are commonly known and referred to by members of the medical profession as "donor sets"; this name having reference to a specific assembly of instrumentalities for the drawing of blood from a donor into a sterile container.

Specifically stated the present invention relates to a donor set as provided for the drawing of blood from the donor and transferring it into a container which may be sealed under relatively high vacuum with a rubber stopper; such a set comprising a length of flexible tubing with needles of hypodermic form fitted to the opposite ends thereof; one of the needles being designed for projection into a vein of the donor and the other being designed to be projected through the stopper into the receiving vessel, or container, thus making the vacuum therein usable to facilitate the extraction of blood and to effect its flow through the tube into the container without contacting outside air.

It is one of the principal objects of this invention to provide a donor set including a simple, effective and inexpensive means, referred to as a "press block," at one end of the tubing for the mounting of the needle that is to be projected through the stopper of the container and which press block provides a convenient, practical and safe device whereby the necessary manual force may be directly applied to the needle to press it through the stopper into the container.

It is also an object of this invention to provide a novel press block for mounting the needle and wherein a sealed connection may be made between the channel of the needle and one end of the flexible tubing, and which block further is designed to serve as a means whereby flow of blood through the tubing may be entirely cut off or precisely regulated.

Still another object of the invention is to provide the needles that are comprised in the set with novel and improved anchoring means at their base ends, to insure positive holding connections with the press block and tubing.

Further objects of the invention reside in the details of construction of the various parts comprised in the set, and in their assembled relationship and mode of use as will hereinafter be described.

In accomplishing the above mentioned and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein:

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Fig. 1 is a perspective view of the complete donor set embodied by the present invention;

Fig. 2 is a perspective view, illustrating the use of the present press block for the projecting of the container needle through the stopper of the vacuumized container;

Fig. 3 is a perspective view of parts embodied in the set, shown enlarged and in separated relationship for better understanding of their function and details of construction;

Fig. 4 is an enlarged sectional detail of a needle and one end of the tubing as secured within the press block; the block and needle being shown in central, longitudinal section;

Fig. 4a is a sectional detail illustrating an alternative means of securing the needle within the press block;

Fig. 5 is a perspective view of the press block, showing its tapered slot and the manner of drawing the flexible tubing thereinto the stop or regulate flow of blood;

Fig. 6 is an upper end view of the press block;

Fig. 7 is a perspective view of a press block of an alternative form of construction;

Fig. 8 is a perspective view of another form of device embodying features of the present invention therein;

Fig. 9 is a perspective view showing a tube clamp as applied to the device of Fig. 8;

Fig. 10 is an enlarged, sectional detail showing the means for and manner of mounting the extracting needle in the end of the tubing; and

Fig. 11 is an enlarged perspective view of the base end portion of one of the needles.

Referring more in detail to the drawings:

In Fig. 1, I have illustrated a complete donor set embodying the present invention. In its present preferred form of construction, it comprises a length of tubing 10, preferably of clear or transparent plastic, approximately $\frac{3}{8}$ " in diameter and three feet long, equipped at one end with a cannula 12, which will hereinafter be referred to as the "extracting needle," and equipped at its other end with a cannula or needle 13, which for explanatory purposes will hereinafter be referred to as the "container needle."

The tubing 10, which is now employed in the set, is an elastic, extremely tough and flexible plastic material. It may be of substantially greater diameter than the needles used therewith, and therefore special devices or fittings must be employed to insure and secure proper joining of the tube ends and what might be termed the hub assemblies of the needles. With this in mind, each of the needles is formed at its

base end with short out-turned prongs or flanges 15, as best shown in Fig. 11. Over the prong equipped end of the extracting needle 12, I have drawn a short length of the rubber tubing 16; the prongs of the needle being embedded therein. This short length of tubing serves as a bushing that gives increased diameter to the base end of the needle. One end of the plastic tubing 10 is then drawn over the bushing 16, which is slightly greater in diameter than the inside diameter of the tubing, and over this there is then applied a tightly fitting sleeve 17 of rubber serving as a clamp. The connection between needle 12 and the tubing 10 is thus made secure and airtight. The parts may be of reduced diameters as in Fig. 3 or of larger diameters as in Fig. 10 for which reason in the latter figure, the bushing 16 and sleeve 17 have been identified by the reference numerals 16' and 17' respectively.

The container needle 13 ordinarily is substantially identical in size and in details of construction to needle 12; it also being formed at its base end with a plurality of short out-turned prongs 15 and this needle is fixedly assembled with the press block. Connection is also made between the needle and other end of the tubing.

The press block is designated in its entirety by reference numeral 20. Preferably it is made of a clear plastic and, in the form of a cylindrical block. In a practical size suitable for ordinary uses, the block 20 is about 1 1/4" long and 5/8" in diameter. It is formed in one end portion, with an axial bore 21 which has a diameter substantially equal to the outside diameter of the tubing 10. The bore 21 leads into an axial bore 22 of greater diameter that continues to the opposite end of the block. The two bores 21 and 22 meet in an annular shoulder 25 that is substantially midway of the ends of the block.

To provide for the anchoring of the container needle 13 in the press block and for joining of an end of the tubing 10 with the anchored needle, a short plastic sleeve 27 is first applied about the base end of the needle and is seated at one end against the out-turned prongs 15, thereof. This sleeve is of such diameter as to be snugly received in the bore 22 of the block 20, as presently explained. That end portion of the tubing 10 that is to be joined with the needle 13 is then projected through the bore 21 of the block, and is passed on through the bore 22 beyond the block end. Then the open end of the tube is applied over a small, centrally perforated disk 28 of plastic. The perforated disk is round and substantially of the same diameter as the sleeve 27 applied about needle 13. With the disk so applied within the end of the tube 10, the tube end is drawn into the block bore 22 to seat the expanded disk containing end thereof against the block shoulder 25. Then a solvent, such as acetone, is applied to the inner end surface and to the side surfaces of the sleeve 27, which is then inserted within the bore 22 so that the solvent treated end will be sealed to the disk 28 and its side surfaces sealed to the walls of bore 22, thus not only securing the needle and tube in the block but also effecting an airtight joint or connection between them. In this assembly the inner end of the needle channel opens into the tubing through the hole of disk 28.

In Fig. 4a I have illustrated an alternative means of securing a modified form of needle within the press block. It will be noted that the needle 13 is formed with a bend or offset portion 13a near the upper end thereof. The plastic

sleeve 27 is molded about the portion 13a of the needle thereby fixedly securing the needle within the sleeve. The upper end of the sleeve is of slightly reduced diameter as at 27a and adapted to have the end of the tube 10 applied thereto. With the tube so applied, the sleeve may then be secured within the block bore 22 and seated against the block shoulder 25 by the use of a solvent as previously described.

Cut diametrically through the upper end of the press block (that being the end from which tubing 10 extends), is a sharp angled V-shaped slot 35. At its open end, the slot has a width substantially equal to the diameter of tube 10, and its side walls converge downwardly to an angle of about ten degrees. The tubing 10 may be drawn down tightly into the V-shaped slot, thus to so constrict or compress the tube walls together as to cut off flow of blood therethrough, or when drawn less tightly, the flow will be partly stopped. By making proper adjustment of the tube, in the slot, flow may be regulated as desired. The block 20, so formed with a V-shaped slot serves a multiple purpose, namely, as a mounting and press block for the container needle and one end of tube 10; and as a cut-off and flow regulating valve.

In Fig. 7, I have illustrated an alternative form of press block 20a. This block is like that already described in dimensions, and is formed with an axial bore 22x leading to shoulder 25' corresponding to these parts in block 20. However, in lieu of axial bore 21, this block 20a has an angular bore 21x directed into a side thereof, and opening into the inner end of bore 22x. The manner of mounting the container needle in bore 22x, and the method of joining the end of tube 10 with the needle, is like that described in connection with the block 20, but the tubing 10 does not extend from the upper end surface of the block. In the use of this alternative form of block, the flat upper end surface thereof is unobstructed for the application of manual pressure for pressing the needle through the bottle stopper.

To adapt this block 20a for the cutting off or regulating of flow of blood through the tube 10, I provide a V-shaped slot 35x, like slot 35 of block 20, leading directly downward from the angular bore 21x. The tubing 10 may be drawn from the bore downwardly into this slot, as indicated in dotted lines. As an additional feature, the block 20a is formed with a horizontal slot 35y of V-shaped form, in a side wall. Such slots or openings may be provided at various suitable locations in the edge surface of the block, without departing from this feature of the invention; it being largely a matter of preference as to where they are located and which one is to be used. In each instance the slot should be so located that the tubing can be drawn more or less tightly thereto for full stoppage or to regulate the flow of blood.

In Fig. 8 I have illustrated another form of press block embodying the principles as of the blocks of Figs. 5 or 7. This block is in the nature of a flat disk 40 applied about a hub within which the base of a needle 13 is sealed. In this application, the disk is used as a means for pressing the needle through the stopper. The tube 10 is applied to the outer end of the hub to connect it with the needle channel. The disk is formed with a deep, narrow V-shaped notch 41 opening to the periphery thereof and into which a part of the tubing adjacent the needle may be drawn, as has

been indicated by the dotted line shown, to regulate or stop flow through the tube.

Assuming the parts to be constructed, and assembled as described, the use of the present donor set, in any of its forms shown would be as follows: First, the tube 10 is drawn tightly into a V-shaped channel or notch of the press block, as in Fig. 5 or as in Figs. 7, 8 or 9, to seal off the channel of the tube at that point. Then the container needle 13 is applied to the container through the container stopper; this act being accomplished by the nurse or doctor by applying the needle point to the stopper and then applying pressure to the press block with the palm of the hand as is illustrated in Fig. 2, or by use of the fingers in use of the device of Fig. 8, to force the needle through the stopper. The extracting needle 12 is then inserted in a vein in the patient's forearm. Then the tube 10 is disengaged from the slot of the block to open the tube channel. Various other procedural techniques may be followed.

When the container needle has pierced the stopper beyond the lower end thereof, the vacuum in the container is transmitted through the needle 13 to the tube 10. When the tube channel is opened, the vacuum will cause the blood from the patient to be sucked through the needle 12, tube 10 and the needle 13 and be deposited in the container. The blood will continue to flow from the patient until the container has been filled or until stopped by drawing the tube into one of the closing slots.

Rate of flow of blood can be regulated if such should be desired, by applying the tube 10 more or less tightly into one of the V-shaped slots of the press block.

The use of press blocks of the kind shown, for mounting a needle and for pinching off flow or suction through the tube, or for regulating flow through the tube, is believed to be novel in this kind of apparatus. Also, the use of a V-shaped slot in an element of such a combination of parts, is believed new, and is of importance because it eliminates the possibility of the nurse or doctor having to leave the blood donor to reach for or look for a clamp to check or regulate the flow of blood. In the device of Fig. 9 a spring wire clamp 45 is shown to be fixed to the hub disk 40 by welding, as at 46, or otherwise. The legs of the clamp member extend beyond the periphery of the disk in slight divergence to form a notch in which the tube 10 can be drawn as shown to cut off or regulate the flow of blood.

Aside from the advantages afforded by the use of push blocks 20, 20a or 40 as means for pressing the container needle through the stopper of the receiving vessel, there is also the advantage residing in the use of blocks 20 and 20a as a means for connecting the needle and the tube end in an airtight joint which cannot be broken under the force used in inserting the needle into the container.

While I have illustrated and described various details of construction in block, needle and tube, the gist of the invention resides primarily in the application of a press block to a needle as used in a donor set, as a means whereby the needle can be pressed through the container stopper, and the tube held sealed until blood is to be drawn.

Having thus described my invention, what I claim as new therein and what I desire to secure by Letters Patent, is:

1. In a means for the extracting of blood from a donor and delivering it to storage into a container, sealed with a pierceable stopper: a press

block having a pressure receiving surface at one end, and said block having a passage therein, opening to the end of the block opposite the pressure surface, a tubular needle fixedly secured in the passage with its pointed end extending from the block, and a flexible, elastic suction tube connected to the other end of the needle and said block having a V-shaped channel therein into which said tube can be moved to effect a constricting of the tube channel.

2. In a means for the extracting of blood from a donor and delivering it to storage into a container, sealed with a pierceable stopper; a press block formed with a pressure receiving surface at one end, and said block having a passage therein opening to that end of the block which is opposite said pressure receiving surface, a tubular needle fixedly secured in the passage in a suction sealed joint with its pointed end extending from that end of the block opposite the pressure surface, and a flexible suction tube extended into the other end of the passage and fixed therein in a suction sealed joint in communication with the needle channel; said block having a V-shaped channel formed therein and leading laterally from that end of the said passage that the said flexible tube enters, and into which channel said tube may be drawn to cause its wall to be pinched together to regulate the closing of or to seal the tube channel at that point.

3. In a donor set of the character described: a press block having a passage therethrough from upper to lower ends, and provided with a pressure surface at its upper end and formed in that end with a V-shaped channel opening at its ends to a side wall of the block and to said passage, a tubular needle mounted in the passage in a suction sealed joint with its pointed end extended from the lower end of the block, and a resilient, flexible suction tube, extended into the channel at its upper end and sealed therein in communication with the needle channel; said tube being adapted to be drawn laterally from said passage and downwardly into said V-shaped channel to cause its walls to be pinched together with suction sealing tightness.

4. A combination as recited in claim 3 wherein said V-shaped channel is of such depth that the tube can be drawn thereinto and extended from the block below the said pressure surface.

5. In a donor set of the character described: in combination, a press block having a pressure receiving surface at one end, and formed with a bore therethrough, a tubular needle, equipped at its base end with a mounting hub that is fitted and secured in one end of said bore in a suction sealed joint, and mounting the needle rigidly in the block with its pointed end extended from the end thereof that is opposite the pressure surface, a flexible resilient suction tube extended into the block bore at its other end, and means sealing that end of the tube in the block bore in communication with the needle channel; said block having a V-shaped channel in its upper end surface, opening at its ends to the said bore and to a side of the block, and into which channel said tube can be drawn, and extended from the block below the said pressure receiving surface, and its walls pinched together with suction sealed tightness.

6. In a means for the extracting of blood from a donor and delivering it to storage into a container sealed with a pierceable stopper: a press block formed at its upper end with a pressure receiving surface, and having a bore therethrough

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opening to the lower end of the block in a portion of an increased diameter providing an annular shoulder in the bore, a tubular needle, a mounting plug sealed about the base end portion of the needle and fitted and sealed in the lower end portion of the said bore, and a flexible, elastic suction tube extended into the bore at the upper end of the block and into that part thereof of larger diameter, an expansion ring fitted within the inner end of the flexible tube, and said inner end of the tube being seated by said ring against said shoulder in the bore in communication, through the ring with the inner end of the needle channel.

7. A combination as recited in claim 6 wherein the said needle mounting block and said expansion ring are abutted and joined in a suction sealed connection.

8. A combination as recited in claim 6 wherein said press block is formed across its upper end surface with a V-shaped channel directed through the upper end of said bore and opening to the sides of the block, and into which channel said suction tube may be drawn to extend from the block below the pressure surface thereof to pinch its walls together to close the channel there-through or to regulate its effective size.

9. A donor set including in combination a flexible tube, a single hollow needle pointed at one

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end, a hub assembly at the opposite end of said needle, means forming a part of said assembly securing an adjacent end of the tube to said needle to and establish communication between the tube and needle bores, needle-manipulating means attached to said hub assembly, said means presenting an edge surface and said surface being formed with an opening having converging edges between which said tube may be received and constricted to regulate fluid flow therethrough.

10. In a donor set in combination a single hollow needle pointed at one end, a hub assembly at the opposite end of said needle, a tube connection forming a part of said assembly and establishing communication with the bore of the needle, needle-manipulating means attached to said hub assembly, said means presenting an edge surface and said surface being formed with an opening having converging edges between which a tube forming a part of said set may be received and constricted to regulate fluid flow there-through.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
1,907,763	England	May 9, 1933
2,409,343	Curtis	Oct. 15, 1946