T. A. FLOOD.

VACCINATING DEVICE.

APPLICATION FILED AUG. 16, 1916.

1,212,927. Patented Jan. 16, 1917.

Fig. 1.

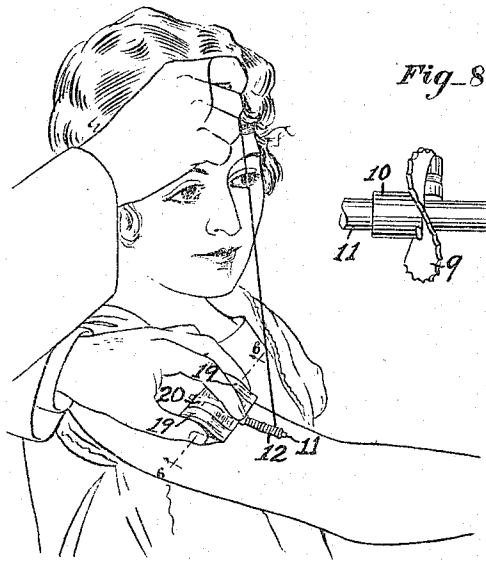


Fig. 8.

Fig. 2.



Fig. 3.

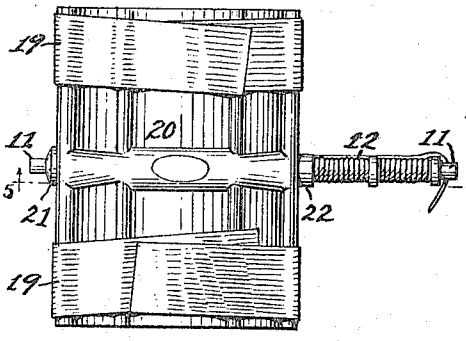


Fig. 4.

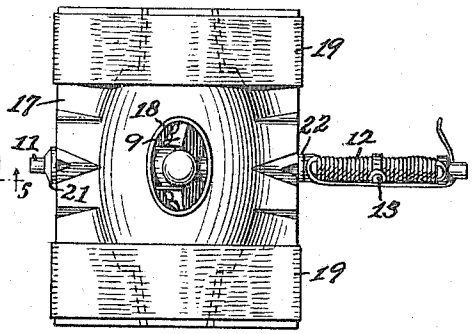


Fig. 5.

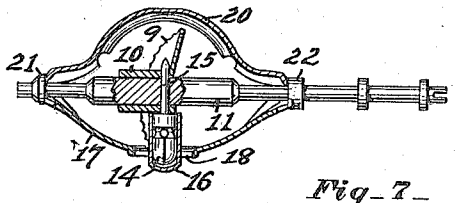


Fig. 6.

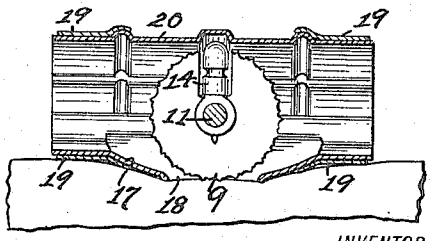
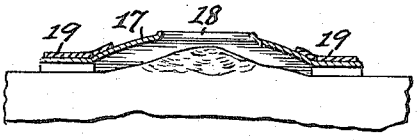


Fig. 7.



WITNESSES

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VACCINATING DEVICE.

1,212,927. Specification of Letters Patent. Patented Jan. 16, 1917.

Application filed August 16, 1916. Serial No. 115,179.

To all whom it may concern:

Be it known that I, THOMAS ARTHUR FLOOD, a citizen of the United States, and a resident of Salt Lake City, in the county of Salt Lake and State of Utah, have invented a certain new and useful Vaccinating Device, of which the following is a full, clear, and exact description.

My invention relates to a mechanical device, the use of which greatly simplifies and expedites the operation of vaccination, materially minimizing the pain, discomfort and inconvenience usually incident thereto; at the same time providing an improved shield or covering to be placed upon the skin and worn over the vaccinated area, primarily to prevent the applied vaccine virus or lymph from being rubbed off, by coming in contact with the clothing or otherwise, and secondly, to minimize the danger of bacterial infection immediately following the vaccination or at any time subsequently thereto.

My invention is fully described in the following specification, of which the accompanying drawings form a part, in which like characters refer to like parts in each of the views, and in which—

Figure 1 is a view of my device and manner of use for scarifying and applying the virus; Fig. 2 is a view of a shield member of the device protecting the scarified area; Fig. 3 is a view of the upper side of the device as a whole; Fig. 4 is a similar view of the opposite side thereof; Fig. 5 is a section taken on the line 5—5 of Fig. 3; Fig. 6 is a section taken on the line 6—6 of Fig. 1; Fig. 7 is a section taken on the line 7—7 of Fig. 2; and Fig. 8 is a detached view of the scarifier and applicator.

My invention consists of eight parts, each of which serves a definite purpose, and when so assembled as to produce a vaccinating device, as aforesaid, it provides:

First, a scarifier for producing a series of fine parallel scratches or scarifications of the skin (human or animal) for the reception of vaccine virus or lymph (or tuberculin, when so desired.) The extent of the scarification produced is limited to a slight superficial abrasion of the epidermis, at whatever region of the body may be selected as a desirable site, but ordinarily at about the middle of the arm, on its outer aspect; but more particularly to a scarification of the skin that is comparatively free from pain or discomfort, as the scarification can be done almost instantly; and, furthermore, a scarification produced in accordance with the principles of an aseptic and hygienic technique. As will be seen from the illustration, the scarifier consists of a rotatable metallic disk 9, approximately $\frac{15}{16}$ of an inch in diameter, provided on its periphery with teeth or serrations at intervals of approximately one-eighth of an inch apart, and also provided with a flange 10 for the purpose of effecting a connection with a metal rod or shaft 11 passing through the center of the disk and serving the purpose of communicating motion to the scarifier through the agency of a thread or cord 12 wrapped around one extremity of the shaft, but wrapped in two directions, as will be seen from the illustration. The thread or cord is so wrapped that it unwinds in one direction for a definite number of turns, eight to ten, and then by slipping over a reversing notch 13, the same number of turns are made in a reverse direction. Two notches are provided on the extremity of the shaft for engaging and securing the thread, and a slot at the end provides a means for preventing the cord from becoming loose.

Secondly, my device applies the vaccine virus or lymph directly to the scarified skin simultaneously with the scarification itself and not only applies the vaccine, as aforesaid, but actually rubs or presses the vaccine into the scarified surface of the skin while the scarification is taking place. This direct or immediate application of the vaccine virus or lymph is effected through the agency of a vaccine applicator 14, which moves with and follows the path of the scarifier and applies and distributes the vaccine at the site required. The applicator will be best understood by referring to Figs. 5 and 6, which show views at right angles to each other. The applicator, which can be made of porcelain, glass, metal, bone, ivory, celluloid, artificial amber, hard rubber, or any other non-corrosive, non-oxidizable, and chemically inert material, consists of a base, neck and rounded extremity. The base is secured to the rod or driving shaft, heretofore mentioned, by means of one or more pegs 15 extending from the base of the applicator through a hole drilled through the rod or shaft. In the approved form, I would make

use of two pegs, instead of one, to prevent the applicator from getting out of alinement. As will be seen in Fig. 5, a small hole is drilled through the neck of the applicator, and from the apex and center of the rounded extremity of the applicator, a narrow slot, approximately $\frac{1}{64}$ of an inch in width, extends down through the rounded extremity, communicating with the hole, as aforesaid. The object of this slot is to hold the vaccine virus or lymph in place by capillarity. The width of the slot may be varied according to requirements, depending upon the viscosity and density of the vaccine or lymph that is used.

A cap 16 is used as a protective cover for the applicator containing the vaccine or lymph, to prevent drying, or deterioration on account of atmospheric and other influences. To insure adequate safety in this respect the open end of the cap is dipped in melted paraffin, wax, or any other suitable material, so that when applied over the applicator, completely covering it and extending down to the base of the applicator where it rests against the shaft, as aforesaid, the connection between the cap and base of the applicator will be sufficiently intimate to hermetically seal in the vaccine, protecting the same from atmospheric and other deteriorating influences.

The shield 17 is intended to be applied to the arm or leg, over the scarified area, immediately after the vaccination is made, to protect the freshly applied vaccine virus or lymph from being rubbed off by contact with the clothing or otherwise. It also affords protection against bacterial infection of the scarification. The shield is preferably made of aluminum, or any other metal of light weight, and so constructed as to afford ample rigidity in order to preserve its shape. The shield is provided with a central aperture 18 so situated as to readily permit inspection of the scarified area at any time, without the necessity of removing the shield from its position, wherever it may be attached to the skin. It is attached to the skin by means of two narrow strips 19 of adhesive tape, one strip being placed over each end of the shield. These adhesive strips are approximately $\frac{1}{2}$ inch in width and $5\frac{1}{4}$ inches in length and serve the purpose, first, of holding the parts of the device together, and, secondly, when the shield is separated from the rest of the mechanism, these strips serve as a means of securely attaching the shield to the skin, without changing or adjusting the position of the strips over the ends of the shield. The ends of these strips are crossed over the back of the device in such a manner as to permit of their easy detachment from the back of the device. When attached to the skin these adhesive strips are sufficiently distant or removed from the site of the scarification as to cause no discomfort or irritation whatever.

The back of the device, 20, is intended primarily to protect the scarifier from injury and infection after it is sterilized and ready for use; but it also serves the important function of a support for the shaft, and as a means of attaching the free ends of the adhesive strips, so that all the parts of the mechanism will remain in place. The back also prevents any lateral motion of the shaft while it is rotating, as the sides of the back serve as an abutment against which the two collars 21 and 22 bear.

When viewed through the aperture of the shield, the serrated periphery of the scarifier appears to move in a sinusoidal curve, but in reality each individual tooth moves forward or backward in perfectly straight lines. Hence the wave-like motion of the scarifier is due to the fact that the scarifier is bent from its center into two opposite directions, producing a compound curve at the periphery. Instead of a compound curve, as described, the scarifier may be made of a perfectly flat disk, mounted at an angle of approximately fifteen degrees from a line intersecting the shaft at right angles, and held in place by a peg or pin, as heretofore described, but in the preferred form I have used a disk with a compound curve as described. One complete revolution of the scarifier will present from four to five teeth at or near the center of the aperture, at four different places on the periphery of the disk. The teeth situated at the points of greatest curvature are practically inactive, as they do not cross or advance sufficiently near to the meridian of the aperture to be effective for purposes of scarification. The total area of skin scarified is about $\frac{1}{4}$ of an inch in length by $\frac{1}{8}$ of an inch in width. In the approved form it is essential that the teeth of the scarifier should extend through or beyond the plane of the oval aperture 18 of the shield 14, for a distance of approximately $\frac{1}{64}$ of an inch, and not as much as $\frac{1}{32}$, as the pressure of the shield against the skin causes the skin to project slightly into the aperture, approximately $\frac{1}{64}$ of an inch, thus insuring an intimate contact between the skin and the teeth of the scarifier. The teeth of the scarifier should be sharp enough to produce a slight ripping effect upon the epidermis, but not so sharp as to cut like a blade. The highest point of the rounded end of the applicator should extend a small fraction beyond the highest point of the teeth, approximately $\frac{1}{64}$ of an inch, or $\frac{1}{32}$ of an inch beyond the plane of the oval aperture, in order to obtain the effect of pressure as the apex of the applicator is rubbed over the skin.

The collars of the shaft to which the scari-

fier is fixed, should be very smooth and should fit sufficiently snug so that no lateral motion is appreciable, but not so tight as to bind or cause too much resistance when the cord is pulled. The cord is best made of heavy white thread, such as is used in sewing carpets, and must be tightly wound around the shaft, especially at the reversing notch, to prevent the thread from slipping off. The thread should be wound on the shaft before all the parts are assembled. The base of the applicator should be dipped in melted wax or paraffin up to the neck, or preferably the open end of the cap or cover for the applicator may be dipped in melted wax or paraffin, so that when the cap is pressed over the applicator the contact will be air-tight, yet easily separated by a slight twist between the fingers when it is desired to use the device as contemplated. If the adhesive strips are so prepared as to leave a blank space for a distance of $\frac{1}{4}$ of an inch, just where they lap over the shield on to the back, so as to leave the margins free from adhesive material, it will greatly facilitate the separation of the various parts after the vaccination and when the shield is about to be applied. The ends of the adhesive strips should be turned under for a distance of from $\frac{1}{8}$ to $\frac{3}{8}$ of an inch, to facilitate the handling of the ends of the strips, when it is desired to take the vaccinator apart. The V-shaped notches at the sides of the shield and the back should be sufficiently deep so as to prevent the shaft from being pulled out of these engaging notches when the device is put in operation. The applicator can be "filled" by dipping the apex in a drop of the vaccine virus or lymph, or it can be filled by any suitable instrument that will convey a sufficient quantity of the vaccine to fill the slot by capillarity. Before filling the slot, the applicator, already mounted in position in an excised section of the scarifier and attached to the shaft by pegs or pins, should be sterilized and the cap immediately applied, as heretofore described. In applying the cap sufficient care must be used to slide the same over the applicator in such a manner as will prevent the vaccine from being smeared along the inside of the cap. With the exception of the thread, adhesive tape and applicator, all other parts of the device can be made of metal, aluminum being preferred for the shield on account of its lightness, and because it is non-oxidizable. The applicator could be made of metal also, if the rounded extremity and slot were covered with a thin impervious and chemically inert film, but bone, ivory, celluloid and artificial amber seem preferable, as they are all capable of taking a high polish and can be made very smooth, which is essential.

The technique is exceedingly simple and can be carried out by any one of ordinary intelligence.

Prepare the skin (arm or leg) in the usual way, cleansing the surface with cotton or gauze dipped in alcohol. (If considered necessary, soap and water may be used first.) No antiseptics or disinfectants of any kind should be applied to the skin, as traces of the same might inactivate the vaccine. The alcohol evaporates and the skin dries in a few minutes. With a slight twisting motion, remove the protective cap projecting through the oval aperture of the shield. This exposes the vaccine. Place the oval aperture against the skin, at the site selected, and preferably at right angles to the arm or leg. The best location is the middle of the arm, on its outer aspect. Holding the device with three fingers, as illustrated in Fig. 1, slip the cord out of the slot at the end of the projecting shaft or run running through the center of the device. Then slip the thread over the notch at the side of the shield. Holding the device securely, but with only slight pressure against the skin, pull the string steadily, straight up, in the direction of the index finger of the left hand. The time required to unwind the string from the shaft is about one second. The movement of unwinding the cord twirls the scarifier several times in one direction, and a like number of times in the opposite direction. If the skin is very thin or delicate, press the shield lightly against the arm, and pull somewhat slowly. This completes the operation. The skin is scarified and the vaccine applied, although no scratches on the skin will be visible for some time. Now, holding the device in the hand, with the aperture toward the palm, peel down the adhesive strips so as to separate the shield from the rest of the mechanism. Discard everything but the shield and the attached strips of tape. The shield will fit the average arm without alteration. If the arm is large, the shield may be bent slightly outward; if small, it may be bent slightly inward. Press down the adhesive strips in position, so they will adhere snugly. The underclothing and sleeve can be pulled down over the shield immediately and the patient dismissed.

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

1. A device of the class described, comprising a casing formed of separable members one of which is provided with an orifice, means in said casing and projected through said orifice for scarifying a surface, means for applying virus to the scarified surface, and means for actuating said scarifying and applying means.

2. A device of the class described, comprising a casing formed of separable mem-

bers one of which is provided with an orifice, means in said casing and projected through said orifice for scarifying a surface, and means for actuating said scarifying means in predetermined degree in each of two directions.

3. A device of the class described, comprising a casing formed of separable members one of which is provided with an orifice, means in said casing and projected through said orifice for scarifying a surface, and a cord in operative connection with said scarifying means for actuating the same.

4. A device of the class described, comprising a casing formed of separable members one of which is provided with an orifice, means in said casing and projected through said orifice for scarifying a surface, a shaft connected with said scarifying means, and a cord wound on said shaft for rotating the same to actuate said scarifying means.

5. A device of the class described, comprising a casing formed of separable members one of which is provided with an orifice, a shaft rotatable in said casing, a toothed disk carried by said shaft and projected through said orifice to scarify a surface, and means for rotating said shaft to actuate said disk.

6. A device of the class described, comprising a casing formed of separable members one of which is provided with an orifice, a shaft rotatable in said casing, a toothed disk carried by said shaft and the teeth of which travel in different planes and project through said orifice, and means for rotating said shaft to actuate said disk to scarify a surface.

7. A device of the class described, comprising a casing formed of separable members one of which is provided with an orifice, a shaft rotatable in said casing, a toothed disk carried by said shaft and projected through said orifice, a virus applicator carried by said shaft, and means for rotating said shaft to actuate said disk to scarify a surface and to apply virus to said surface.

8. A device of the class described, comprising a casing formed of separable members one of which is provided with an orifice, adhesive bands holding said members together, and means in said casing and projected through said orifice for scarifying a surface, said orifice member being adapted to be employed as a shield for said surface and to be held in place by said adhesive bands.

9. A device of the class described, comprising a casing formed of separable members one of which is provided with an orifice, means in said casing and projected through said orifice for scarifying a surface, means for applying virus to said scarified surface, means for protecting said virus-applying means when said device is not in use, and means for actuating said scarifying and virus-applying means.

THOMAS ARTHUR FLOOD.

Witnesses:
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I. M. SOULÉ.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."