

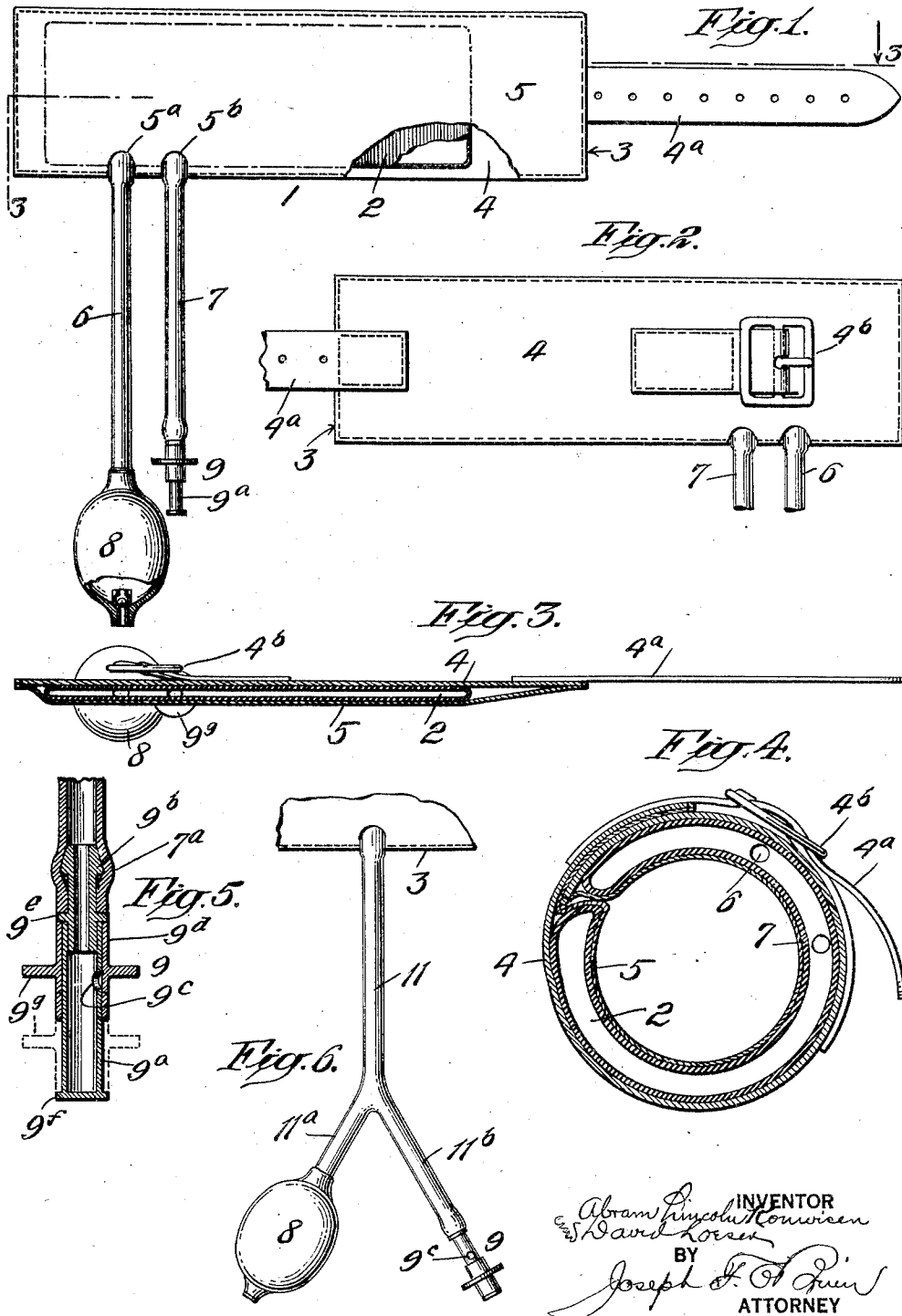
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PNEUMATIC TOURNIQUET

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PNEUMATIC TOURNIQUET.

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This invention relates to improvements in pneumatic tourniquets, and more particularly has reference to the provision of a pneumatic tourniquet which will satisfy the requirements of physicians and others in making intravenous injections or infusions.

One of the objects of our invention is to produce a pneumatic tourniquet which may be utilized to make a good intravenous injection, and to this end, to produce a tourniquet which may be easily adjusted on limbs of varying sizes, by the use of which the application of air pressure will be substantially painless and by the use of which this air pressure may instantaneously and immediately before the injection be released without shock or jar, thus avoiding any agitation of the needle or syringe and enabling the normal flow of blood through the blood vessel to be started before the injection so as to carry along the medicine injected into the blood stream.

Another object of this invention is to provide a mechanical releasing valve or device the movement of which will be unaffected by the release of air pressure in a tourniquet and may be quickly and positively moved by hand from closed to open position with a uniform degree of movement irrespective of the release thereby of air pressure, thus avoiding any snap or jar and consequently any jerk or rebound which would be likely to cause a displacement of the needle or an unintentional movement of the operator's body and, furthermore, avoiding the usual spring or snap releases which have the effect not only of jarring the tourniquet and disconcerting the operator but often jarring the needle out of the vein, in which event it is necessary to perform the operation over again including a replacement of the tourniquet and resulting in embarrassment and annoyance to the operator and increasing the nervousness and loss of confidence on the part of the patient.

Another object of the invention is to enable good intravenous infusions to be made by a single operator or surgeon without the necessity of an assistant.

With these and other objects in view, the invention comprises the combination of

members and arrangement of parts so combined as to co-act and cooperate with each other in the performance of the functions and the accomplishment of the results herein contemplated, and comprises in one of its adaptations the species or preferred form illustrated in the accompanying drawings, in which:—

Fig. 1 is a plan view of the inner side of any tourniquet having a portion broken away to show the inflatable bag;

Fig. 2 is a fragmentary view, in plan, of the outer side of the tourniquet;

Fig. 3 is a longitudinal section on the line 3—3 of Fig. 1, looking in the direction of the arrow;

Fig. 4 is a similar longitudinal section showing the ends of the tourniquet fastened together and the bag inflated;

Fig. 5 is a detail view of the air-release valve used by us; and

Fig. 6 is a view showing in plan a modified form of the air-pumping and air-release tubes used by us.

Referring now to these drawings, which illustrate a preferred embodiment of our invention, 1 indicates a tourniquet comprising an elastic inflatable member 2 preferably comprising a relatively thin flat and elongated rubber bag enclosed in a casing or holder 3 formed of a flexible leather binder 4 having attaching means such as a buckle 4^a and strap 4^b and a lining 5, said binder and lining being connected at their edges to form an enclosing casing for the inflatable bag which is positioned between the fabric lining and the leather binding member.

As illustrated, the lining member of the casing or holder 3 is provided with two apertures 5^a, 5^b through which, as shown in Figs. 1, 2 and 3, a pair of flexible tubes 6 and 7 pass. These tubes 6 and 7 are preferably formed of rubber, extend through said apertures 5^a, 5^b and are connected and communicate at one end with the inflatable bag 2. One of these tubes is provided at its opposite free end with a suitable pumping device such as the bulb 8, and the other tube 7 has at its free end 7 an air-release valve 9 which is adapted to be quickly and positively moved from closed to open position

by hand with a uniform degree of movement irrespective of and unaffected by the movement of the released air or by other causes extraneous of the hand pressure applied.

5 We are thus enabled to release air from the bag without any snap or jar and to avoid any sudden release of the air or any jerk or rebound which would be likely to cause a displacement of the needle or to produce an unintentional movement of the operator's body, and eliminating the use of the usual spring or snap releases which have the effect not only of jarring the tourniquet and disconcerting the operator but often jarring the needle out of the vein, in which event it is necessary to perform the operation over again including a replacement of the tourniquet and resulting in embarrassment and annoyance to the operator and increasing the nervousness and loss of confidence on the part of the patient.

In the preferred embodiment of our invention the releasing device 9 comprises a hollow stem 9^a preferably having a nozzle portion 9^b adapted to be inserted into the end 7^a of the tube 7 to form a tight joint therewith and an air release aperture 9^c normally closed by a cylindrical sliding valve member 9^d which is movable on the hollow stem 9^a transversely across the air-release aperture from its closed position indicated in full lines in Fig. 5 with its upper ends abutting against the stop washer 9^e connected to the nozzle 9^b to the open air-releasing position shown in dotted lines in said Fig. 5 with the opposite end in contact with a limiting stop 9^f on said stem 9. The sliding valve 9^d is preferably provided with a finger grip projection 9^g and it will be apparent that the movement of this valve will be positive and unaffected by the movement of the released air.

In Fig. 6, a single tube 11 is connected to the inflatable bag within the casing 3 and this single tube has branches 11^a, 11^b to one of which branches a bulb 8 is connected and to the other a valve 9. In other respects the device is similar to that hereinabove described.

It will be understood that it is desirable to enable an intravenous infusion or injection to be made by the surgeon alone without the necessity of an assistant; that the release of the tourniquet or the air pressure therein is an important function in this operation; also that it is desirable to provide a release which will avoid any sudden release of the air pressure, will prevent any rebound thereof which might displace the needle or to cause unintentional motion of the surgeon's body, and which will avoid any jarring of the needle out of the vein. Such a jarring, of course, would necessitate replacement of the tourniquet and great annoyance and embarrassment besides causing

nervousness and loss of confidence on the patient's part. By the use of our invention this sudden release, rebound and jarring is completely avoided and the surgeon may proceed with confidence to release the air pressure so as to permit the flow of blood to carry along the injection, and immediately thereafter to inject the liquid into the vein.

In operating our improved tourniquet, it is adjusted to conform to the size of the patient's arm, and with the tubes in such position as not to obscure the cephalic veins, the tourniquet without any inflation is fastened to the arm of the patient without pressure and with the valve 9 in closed position. The syringe is then prepared for injection, the site of injection being sterilized in the usual way. The patient should hold the arm rigid and at the same time fold the fingers in the palm of the hand, making a fist. The tourniquet is now inflated by pressure on the bulb 8 until the vein to be injected becomes visible. The needle of the syringe being attached is then inserted in the vein. A few drops of blood will appear in the barrel if properly inserted. The valve 9^d is then moved downwardly on the stem 9^a to release the air pressure and the syringe is then immediately operated to inject the medicine into the vein or blood vessel, the blood pressure being thus released will carry the medicine along into the blood stream of the patient. If desired the patient may be instructed to hold the tourniquet valve in his other hand and to release the air pressure when ordered so to do by the surgeon. This procedure often has a very desirable psychological effect on the patient and lessens the nervous tension usually occurring during such an injection.

Having described our invention, we claim:—

1. A pneumatic tourniquet embodying an inflatable bag, air-pumping means connected with said bag, and air-release means also connected with said bag and comprising a stationary valve member and a movable valve member having a positive sliding movement relatively to said stationary member, one of said members being provided with an air release aperture arranged therein to be closed and opened upon said sliding movement in opposite directions of said movable member.

2. A pneumatic tourniquet embodying an inflatable bag, air-pumping means connected with said bag, and air-release means also connected with said bag and comprising a hollow metallic valve element having an air-release aperture and a valve member having a positive sliding movement to close and open said aperture.

3. A pneumatic tourniquet embodying an inflatable bag, air-pumping means connected with said bag, and air-release means also

connected with said bag and comprising a
cylindrical metallic valve stem closed at its
end having an air-release aperture extending
through its cylindrical surface and a slid-
5 able valve member also cylindrical in con-
formation fitting over and slidable upon said
valve stem to positively open and close said

aperture and to be retained positively in po-
sition irrespective of the escaping air.

In witness whereof, we have signed our 10
names to the foregoing specification.

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