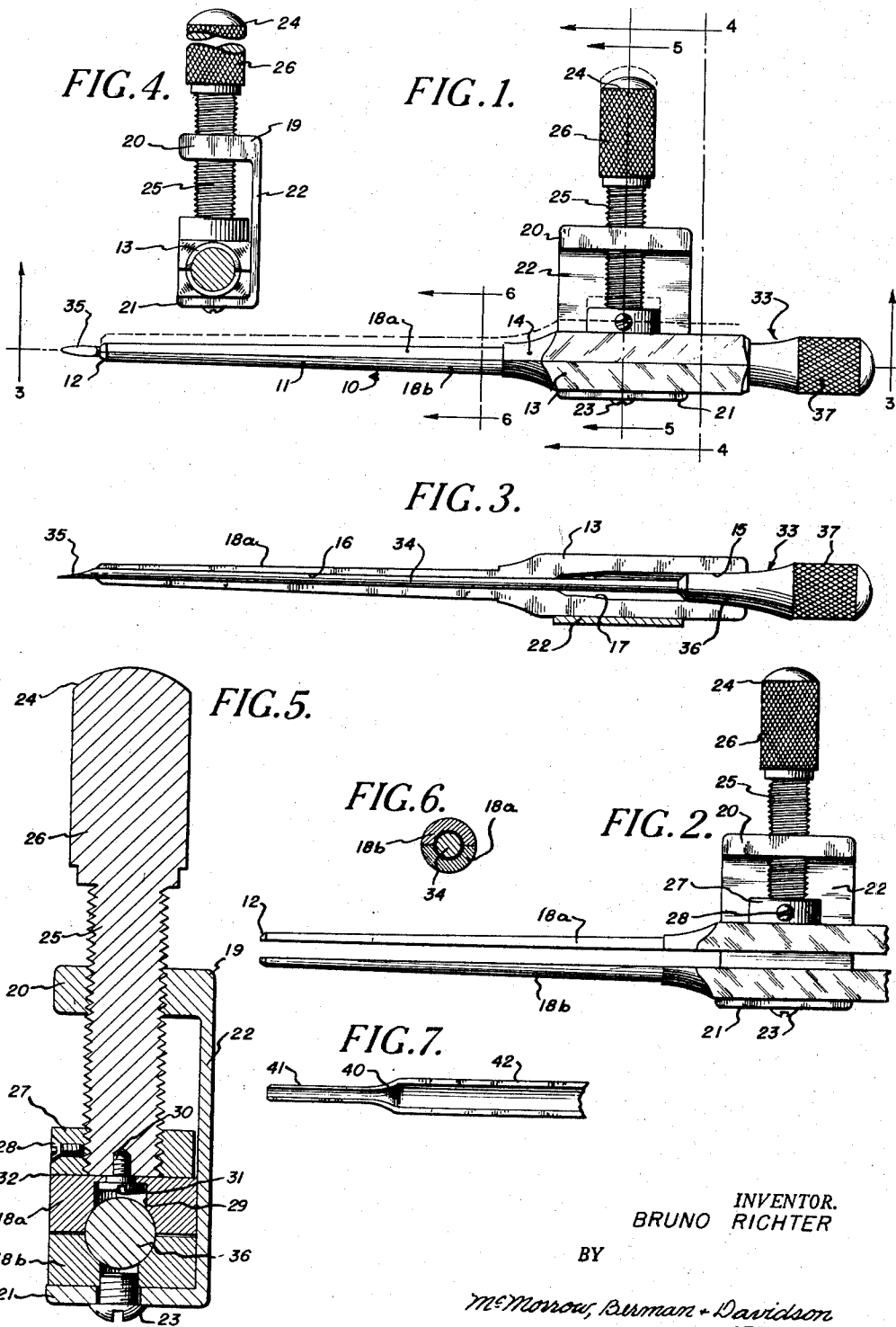


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B. RICHTER
EXPANSILE SURGICAL NEEDLE

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INVENTOR.
BRUNO RICHTER
BY

McMorrow, Burman + Davidson
ATTORNEYS

UNITED STATES PATENT OFFICE

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EXPANSILE SURGICAL NEEDLE

Bruno Richter, Glen Ellyn, Ill.

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2 Claims. (Cl. 128-221)

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This invention relates to expansile surgical needles and more particularly to a needle for introducing a tube, such as a catheter, into a blood vessel, such as a vein.

It is among the objects of the invention to provide an improved expansile surgical needle which can be inserted into a blood vessel to provide a small opening in the blood vessel wall and then expand it to enlarge the opening and, at the same time provide a passageway through which a tube larger than the needle itself can be inserted into the vein, which does not necessitate sacrificing the vein or cause material injury thereto, which can be provided in various sizes, and which is strong and durable in construction, positive in operation, and easy to use.

Other objects and advantages will become apparent from a consideration of the following description and the appended claims in conjunction with the accompanying drawing wherein:

Figure 1 is a side elevation of an expansile needle illustrative of the invention with the needle in closed condition;

Figure 2 is a view similar to Figure 1 with the needle in open or expanded condition;

Figure 3 is a cross sectional view on the line 3-3 of Figure 1;

Figure 4 is a cross sectional view on the line 4-4 of Figure 1;

Figure 5 is a cross sectional view on an enlarged scale on the line 5-5 of Figure 1;

Figure 6 is a cross sectional view on the line 6-6 of Figure 1; and

Figure 7 is a top plan view of a fragmentary portion of a needle of smaller size than the needle illustrated in Figures 1 to 6 inclusive.

With continued reference to the drawing, the expansile needle assembly of the present invention comprises an elongated, tubular surgical needle, generally indicated at 10, and comprising a tubular shank portion 11 which is substantially pointed at one end, as indicated at 12, and is slightly tapered toward its pointed end, and at the larger end of the shank 11 an enlarged portion 13 of rectangular cross section and having substantially parallel opposite sides. The enlarged portion 13 is joined to the larger end of the shank portion 11 by a tapered shoulder 14 and the enlarged portion contains a slightly tapered counterbore 15 which is larger than and coaxial with the bore 16 of the shank and joined to the shank bore 16 by a tapering intermediate portion 17 of the bore. This needle is longitudinally split into two substantially identical parts 18a and 18b provided with flat meeting surfaces which con-

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tact completely when the two parts of the needle are together, as illustrated in Figure 1.

A U-shaped bracket 19 having two spaced apart, substantially parallel legs 20 and 21 extending perpendicularly from the same side of its straight intermediate portion 22 receives the enlarged portion 13 of the needle between the legs 20 and 21. The distance between the legs 20 and 21 is greater than the thickness of the enlarged portion of the needle and this portion of the needle is in contact with the leg 21 and the needle part 18b is secured to the leg 21 by a screw 23 which extends through an aperture in the leg 21 and is threaded into a tapped hole in the enlarged portion of the needle part 18b.

A thumbscrew 24 having an externally screw threaded shank 25 and a knurled knob 26 at one end of the shank is threaded through a screw threaded aperture provided in the bracket leg 20 and a circular collar 27 receives the end portion of the shank 25 opposite the knob 26 and is secured thereon by a set screw 28 which is threaded through a tapped hole provided in the collar.

The enlarged portion of the needle part 18a is provided with a stepped hole 29 extending from the counterbore 15 to the major surface of the enlarged portion of this part and a screw 30 extends through this stepped hole and is threaded into a tapped hole provided in the end of the thumbscrew shank 25 at the center of the shank end. This screw has an enlarged head 31 which overlies the shoulder provided by the step in the hole or aperture 29 and has an annular shoulder 32 which bears against the adjacent end of the shank 25 so that the thumbscrew shank is secured to the needle part 18a for free rotation relative to this needle part.

The hole in part 18b receiving screw 23 is of sufficient size that a screwdriver can be inserted through this hole to tighten the screw 30.

The collar 27 provides a bearing surface of large area bearing on the major surface of the enlarged portion of the needle part 18a and the screw 30 secures the needle part firmly to the end of the thumbscrew shank so that as the thumbscrew is threaded inwardly and outwardly through the bracket leg 20, the needle part 18a will be maintained substantially parallel to the needle part 18b, as is clearly illustrated in Figure 2.

When the needle is in closed or contracted condition, as illustrated in Figure 1, a stylet, generally indicated at 33, is extended through the bore of the needle. This stylet has a shank portion 34 of a size to closely fit the bore in the

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shank portion of the needle and has at one end a point 35 which extends beyond the smaller end of the shank portion 11 of the needle. At the opposite end of the shank 34 the stylet has an enlarged cylindrical portion 36 which fits in the counterbore 15 in the enlarged portion of the needle and has at the outer end of this enlargement 36 a further enlarged and externally knurled knob 37.

When the two parts of the needle are forced together with the stylet between them, as illustrated in Figure 1, the needle may be used to puncture the wall of a vein. The needle is very small in size, the accompanying drawings being greatly exaggerated for the sake of clearness in the illustration, so that the puncture made in the blood vessel wall is very small and a small blood vessel can be successfully punctured with this device. After the puncture has been made the stylet 33 may be removed to test the puncture. If the puncture has gone completely through the blood vessel wall and into the lumen of the blood vessel, a flow of blood will occur when the stylet is removed from the needle. The thumbscrew 24 may then be rotated to separate the needle parts 18a and 18b thereby enlarging the opening in the blood vessel and providing a passageway between these two needle parts for the introduction of a catheter tube into the blood vessel through the opening provided in the wall thereof. After the catheter has been introduced into the blood vessel the needle is withdrawn and the blood vessel wall will contract around the catheter providing a seal which will substantially preclude the leakage of blood between the catheter and the blood vessel wall.

The smaller size needle illustrated in Figure 7 is reduced in size only near the smaller end of the shank portion of the needle, the needle being necked in at 40 to provide a reduced extension 41 at the smaller end of the shank 42. The stylet used in this needle will have a correspondingly reduced portion at its pointed end to pass through the restricted bore in the reduced portion 41 of the needle. Otherwise the construction using a small needle is the same as that illustrated in Figures 1 to 6 inclusive and described above.

The invention may be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The present embodiment is, therefore, to be considered in all respects as illustrative and not restrictive, the scope of the invention being indicated by the

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appended claims rather than by the foregoing description, and all changes which come within the meaning and range of equivalency of the claims are, therefore, intended to be embraced therein.

What is claimed is:

1. An expansile needle assembly comprising an elongated tubular needle having one end substantially pointed and having at its opposite end an enlargement of rectangular cross sectional shape provided with a counterbore, said needle being longitudinally divided into two substantially identical parts, a U-shaped bracket receiving the enlarged portion of said needle, means attaching one part of said needle to one leg of said bracket the other leg of said bracket having a screw threaded aperture therein, a thumbscrew threaded through said aperture, and means rotatably connecting said thumbscrew to the other part of said needle at the end of said thumbscrew adjacent said other needle part.

2. An expansile surgical needle assembly comprising an elongated tubular needle substantially pointed at one end and having an enlargement at its other end, said needle being longitudinally divided into two substantially identical parts, and means attached to the two parts of said needle at the enlarged portion thereof and manually operable to move said needle parts toward and away from each other, said needle having a counterbore in the enlarged portion thereof and a tapered bore portion connecting the adjacent ends of said counterbore and the remainder of the bore in said tubular needle to facilitate the passage of a tube through said needle.

BRUNO RICHTER.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
938,951	Bell	Nov. 12, 1909
1,087,845	Stevens	Feb. 17, 1914
1,365,387	Duryea	Jan. 11, 1921
1,523,068	Hein	Jan. 13, 1925
2,187,687	Harper	Jan. 16, 1940
2,198,319	Silverman	Apr. 23, 1940

FOREIGN PATENTS

Number	Country	Date
177,194	Great Britain	Mar. 20, 1922