

Dec. 7, 1948.

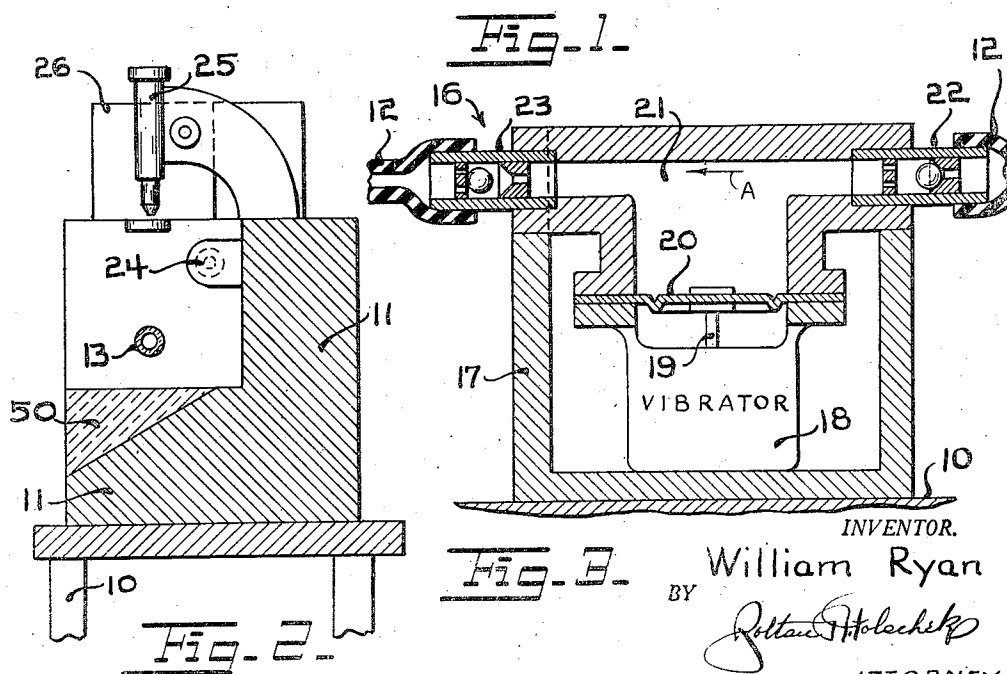
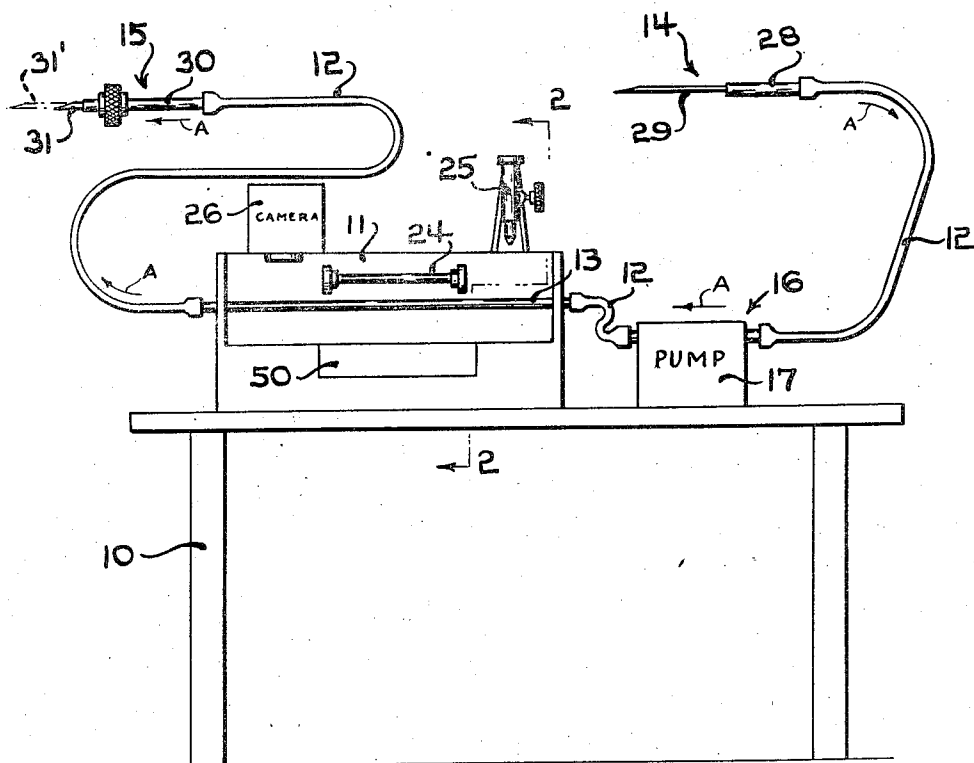
W. RYAN

2,455,810

DEVICE FOR INSPECTING BLOOD CIRCULATION

Filed June 8, 1945

2 Sheets-Sheet 1



Dec. 7, 1948.

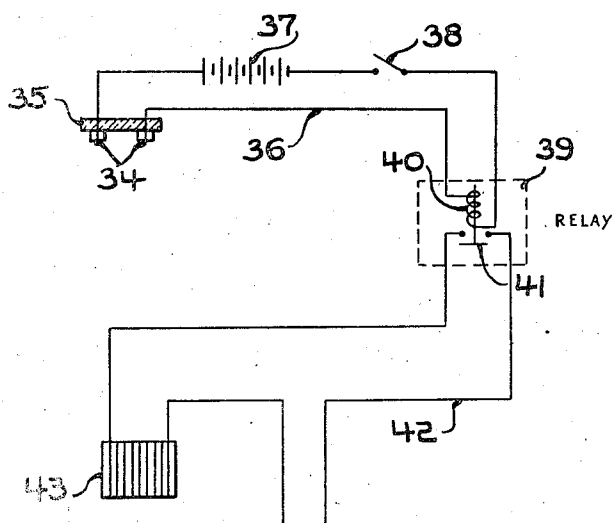
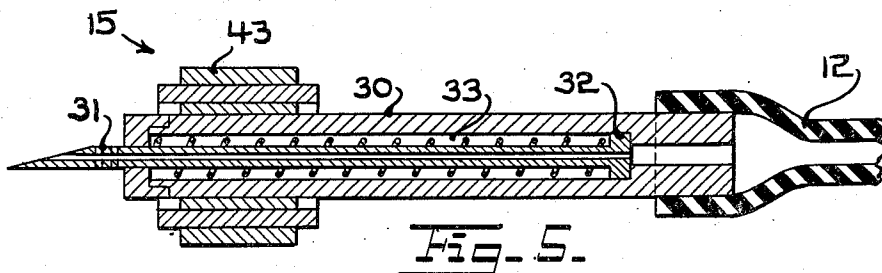
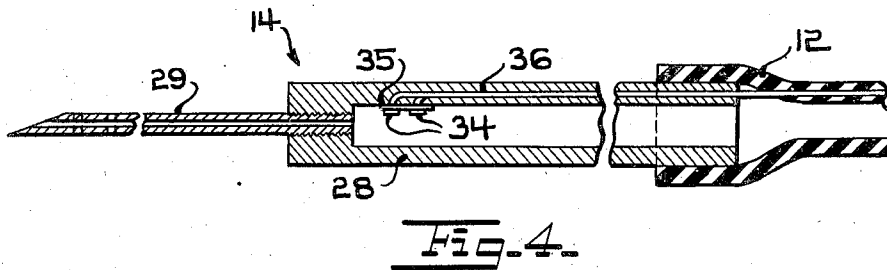
W. RYAN

2,455,810

DEVICE FOR INSPECTING BLOOD CIRCULATION

Filed June 8, 1945

2 Sheets-Sheet 2



INVENTOR.
William Ryan
BY
Gottlieb H. Blachnik
ATTORNEY.

UNITED STATES PATENT OFFICE

2,455,810

DEVICE FOR INSPECTING BLOOD CIRCULATION

William Ryan, New York, N. Y.

Application June 8, 1945, Serial No. 598,376

2 Claims. (Cl. 128—395)

1

This invention relates to new and useful improvements in a device for inspecting blood in circulation.

More specifically, the invention proposes the construction of a device for inspecting blood in circulation characterized by a pipe line having a transparent section and provided at its ends with needles adapted to be inserted into the blood vessels of the human body for conveying blood to the exterior of the body, permitting it to be conveniently inspected when passing through the transparent section.

A further object of the invention proposes the provision of a pump in the pipe line for assisting the pump action of the heart in circulating the blood through the pipe line.

Another object of the invention proposes the provision of a means for illuminating the transparent section of the pipe line so that the blood passing through the transparent section may be magnified and conveniently examined preferably by means of a microscope.

Still another object of the invention proposes the provision of a camera in connection with the transparent section for permitting the blood passing through the transparent section to be actually photographed for record purposes.

Still another object of the invention proposes the provision of a means for eliminating the possibility of inserting the discharge needle into the blood vessels of the human body prior to the insertion of the intake needle, to eliminate the possibility of the insertion of the discharge needle and the pumping of air into the blood vessels of the human body.

Still another object of the invention proposes the construction of a device for inspecting blood in circulation which is simple and durable and which may be manufactured and sold at a reasonable cost.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawing forming a material part of this disclosure:

Fig. 1 is a front elevational view of a device for inspecting blood in circulation and constructed in accordance with this invention.

Fig. 2 is an enlarged partial vertical sectional view taken on the line 2—2 of Fig. 1.

Fig. 3 is an enlarged vertical sectional view of the pump used for circulating the blood.

Fig. 4 is an enlarged sectional view of the intake needle.

Fig. 5 is an enlarged vertical sectional view of the discharge needle.

2

Fig. 6 is a schematic wiring diagram of the device.

The device for inspecting blood in circulation, according to this invention, includes a table 10 upon which a bracket 11 is supported. A pipe line 12 is provided with a transparent section 13 which is supported in the bracket 11. This transparent section 13 is preferably a piece of glass or tubular plastic material which possesses a fine degree of transparency so as not to interfere with the inspection and examination of the blood passing therethrough. The remaining portion of the pipe line 12 is constructed of rubber or other similar materials.

One end of the pipeline 12 is provided with an intake needle 14 and the other end with a discharge needle 15. These needles 14 and 15 are adapted to be inserted into the blood vessels of the human body to circulate the blood of these vessels through the pipe 12 permitting the inspection of the blood at the transparent section 13.

A pump 16 is provided in the pipe line 12 for assisting the heart of the body in circulating the blood. This pump 16 includes a hollow casing 17 which encloses an electric vibrator 18. The vibrator 18 has a projecting stem 19 connected with a flexible diaphragm 20 projected across the hollow chamber 21 of the casing 17. The hollow chamber 21 forms a continuation of the pipe 12. The entrance to the hollow chamber 21 is provided with a one way inlet valve 22 and the exit from the hollow chamber 21 is provided with a one way discharge valve 23. Thus as the diaphragm 20 is oscillated by the vibrator 18 it will cause the blood to be sucked into the chamber 21 through the one way inlet valve 22 and discharge this blood through the one way discharge valve 23. The valves 22 and 23 cooperate to cause the blood to move in the direction of the arrows in Figs. 1 and 3 from the intake needle 14 through the transparent section 13 to the discharge needle 15.

Means is provided on the bracket 11 for illuminating the transparent section 13 of the pipe 12. This means comprising a neon type electric light 24 supported on the back wall of the bracket 11 so that the light will fall onto the transparent tube 13. A conventional adjustable microscope 25 is also supported upon the bracket 11 adjacent the light 24 for permitting the blood passing through the transparent section 13 to be conveniently inspected. On the opposite side of the light 24, the bracket 11 supports a camera 26 which may be used for photographing the blood passing through the transparent section 13. Further details of the construction of the microscope 25 and the camera 26 will not be given in this specification as these details form no part

3

of this invention and similar devices are generally known by those skilled in the art.

The intake needle 14 is characterized by a base section 28 which is tubular in nature and which is inserted into the end of the pipe line 12. This base section 28 is threadedly engaged by a fine tubular needle section 29 which is adapted to be inserted into the blood vessel at one side of the body. The discharge needle 15 is characterized by a base section 30. This base section 30 is constructed of plastic or other non-magnetic materials and is inserted into the opposite end of the pipe line 12. This base section 30 slidably supports a needle section 31 which is adapted to be inserted into the body for conveying the blood, taken out through the intake needle 14, back into the body. This needle 31 is provided with an internal shoulder 32 and an expansion spring 33 operates between the shoulder 32 and the opposite end of the base section 30 for urging the needle 31 into a retracted position within the base section 30. The needle 31 is constructed of metallic magnetic material.

Normally the needle section 29 of the intake needle 14 is extended, indicating that this needle should be first inserted into the blood vessel. Electrically controlled means is provided and is adapted to be set in operation by the blood entering the intake needle 14 to extend the needle section 31 of the discharge needle 15 to permit it to be inserted in the blood vessel of the body. Having the needle section 31 of the discharge needle 15 retracted eliminates the possibility of inserting this discharge needle into the blood vessel of the body prior to the intake needle 14, to eliminate the possibility of circulating air in the blood vessel.

Fig. 6 illustrates a schematic wiring diagram of the device for controlling the extension of the needle portion 31 of the discharge needle 15. This means comprises a pair of spaced electric contacts 34 mounted upon a piece of non-conductive material 35 mounted on the interior of the base section 28 of the intake needle 14. These contacts 34 are mounted in a circuit 36 which includes a dry cell 37, a master switch 38 and a relay 39. The blood upon entering the intake needle 14 will close the space between the contacts 34, completing the circuit 36 (if the master switch 38 is closed) to energize the coil 40 of the relay 39. Energizing the coil 40 will cause the switch 41 of the relay 39 to be closed. This switch 41 is mounted in a circuit 42 which includes a source of power (not shown on the drawing) and a solenoid 43 which is mounted upon the forward end of the base section 30 of the discharge needle 15. Energization of the circuit 42 upon closing the switch 41 of the relay 39 will cause the solenoid 43 to be energized. This will extend the needle section 31 of the discharge needle 15 against the action of the spring 33 as illustrated by the dot and dash lines 31' in Fig. 1. In this extended position this needle portion 31 may be inserted into a blood vessel.

The operation of this device is as follows:

The pump 16 is set in operation and the intake needle 14 is inserted into the blood vessel of a human body. The blood upon entering the needle 14 will close the contacts 34 and complete the circuit 36 to energize the relay 39. This relay 39 will then close the circuit 42 and energize the solenoid 43, immediately extending the needle portion 31 of the discharge needle permitting it also to be inserted in a blood vessel. The pump

4

16 will continue operating to circulate the blood of the human body through the pipe line 12 from the intake needle 14 through the discharge needle 15.

With the blood circulating through the pipe line 12, the light 24 may be turned on to illuminate the transparent section 13 of the pipe line 12. The microscope 25 may then be used to view the blood as it circulates through this transparent section and the camera 26 may be used to photograph the blood passing through the transparent section 13. At the close of the inspection period, the needles 14 and 15 are withdrawn from the blood vessels and the machine is stopped by shutting off the pump 16 and opening the master switch 38. The bracket 11 also supports a triangular sighting glass 50 which may be used to view a larger area of the transparent section 13 of the pipe line 12.

While I have illustrated and described the preferred embodiments of my invention, it is to be understood that I do not limit myself to the precise constructions herein disclosed and the right is reserved to all changes and modifications coming within the scope of the invention as defined in the appended claims.

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

1. In an inspecting device for blood in circulation, a pipe line having a transparent section, needles on the ends of said pipe line for insertion in the blood vessels of the human body, a pump in said pipe line for circulating the blood of the body through the pipe line, said needles being characterized by an intake needle and a discharge needle, and means for eliminating the possibility of inserting the discharge needle prior to the insertion of the intake needle, said means including an element normally urging said discharge needle into an inoperative position, and solenoid means for activating said discharge needle into operative position when blood enters said intake needle.

2. In an inspecting device for blood in circulation needles including an intake needle and a discharge needle for the flow of said blood and means for eliminating the possibility of inserting the discharge needle prior to the insertion of the intake needle, said means including an element normally urging said discharge needle into an inoperative position and solenoid means for activating said discharge needle into operative position when blood enters said intake needle.

WILLIAM RYAN.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
298,469	Hornig	May 13, 1884
1,290,647	Nyvall	Jan. 7, 1919
1,683,877	Edblome	Sept. 11, 1938
2,257,331	Clarke	Sept. 30, 1941
2,308,516	Knott	Jan. 19, 1943
2,357,238	Trimble	Aug. 29, 1944

FOREIGN PATENTS

Number	Country	Date
492,770	Germany	Mar. 5, 1930