

fastened to a reduced portion 147 of the block 139 by a collar 146A. The shell 146 is provided with a threaded portion 148 which projects beyond the surface of the block 139 to receive mating threads 149 on a similar enclosing shell 150 of male section 145 of the connector. The shell 150 is threadably attached to the block 144 so that threads 149 can be screwed into the threads 148 by turning the shell 150. As the threads 149 advance into mating threads 148, the surface of block 144 approaches the surface of block 139 thereby causing an O-ring 151, which surrounds the tube 143, to be compressed between the flange 141 of tube 140 and the surface of block 144, thereby providing a leak-proof joint. While only one set of interconnecting tubes 140 and 143 have been described, it is quite obvious that any number required might be employed, limited only by the size of the connector.

The blood reservoir can be any suitable container, such as the tank 32 (FIGS. 16 and 17), and provided with a cover 155 which may be securely attached to the tank. Two openings 156 and 157 are provided in the top 155. The opening 156 receives a fitting 158 through which two blood line tubes 159 project. These tubes depend into the synthetic liquid blood 160 and are surrounded by a strainer 161 which is attached at its upper end to the fitting 158. The other opening 157 contains a similar fitting 162 having two holes therein, one for receiving a vent pipe 163 and the other for receiving a blood return pipe 164. A tube 165 connects the upper end of one of the tubes 159 with a pulsating arterial pump 166 (FIGS. 21 and 22) through a connector 167 and lead tube 165A. The pump 166 is mounted upon a bracket 168 on a plate 170 which is resiliently supported upon shock mounts 171 on brackets 172 secured to the walls of a box 174. These, together with other components about to be described, comprise the mechanical unit 31 mentioned above. The pulsating pump 166 is a diaphragm type but may be any suitable type.

It is driven by a reciprocating drive rod 175 which is actuated by a crank 176 on an electric motor 178. The pulsations caused by the reciprocating rod 175 are timed to the equivalent of a heart-beat by reduction gears in the motor 178, or if desired by suitable electrical controls. Another tube 170 connects second tube 159 in the reservoir 32 with a pulsating venous pump 180 through the connector 167 and lead tube 179A. Inasmuch as the venous pump 180 supplies blood to the veins, a practically steady flow of blood is required. This is accomplished by passing the blood through an attenuating ram 182. A second motor 183 drives the venous pump 180 similarly to that described for the arterial pump 166.

To provide compactness and portability, it will be noted that the plate 170 is suspended practically midway in the box 174, thus making allowance for fastening components on the bottom side of the plate, including pump 180 and motor 183. A tube 184 extends from the delivery end of the pump 180 through a hole in plate 170 to the ram 182. Another tube 185 connects the delivery end of ram 182 through a connector 186 and extension tube 185A to a bank of venous control valves 188 (FIG. 19). Similarly, a tube 190 connects the delivery end of the arterial pump 166 with a bank of arterial control valves 191 through the connector 186 and an extension tube 190A. In order to simulate inhale and exhale sounds, such as would accompany chest wounds, a pulsating air supply is provided. This is accomplished by the use of a compressible bag 192 (FIGS. 22 and 23) which is completely enclosed except for one opening where a tube 193 is connected. This tube joins with connector 186 and thence through an extension tube 193A to an air control valve 194 (FIG. 19). The pulsations are produced by the reciprocating movements of a rod 195 at the end of which a plate 196 is attached which alternately squeezes and releases the bag 192, thus simulating exhale and inhale of air through the tubes 193. The rod 195 is jour-

nalled in suitable bearings in supports 198 depending below the plate 170. The free end of the rod 195 is attached through a connecting rod 199 to a crank 200 which is driven through shaft 201 and a suitable gear reduction combination (not shown) by a motor 202. The bag 192 is supported in a rectangular box-like support 203 with an open side which also depends from the plate 170.

For the purpose of portability as well as ease of assembly, it will be observed that the various inter-connecting blood carrying tubes, such as 185A and 190A, and the air-carrying tube 193A, are threaded through a plastic casing 204 (FIG. 22) to form the service cord 30 mentioned above. The service cord includes the tubes 185A, 193A and 190A, the surrounding casing 204 and connectors 186 at one end and 205 at the opposite end (FIG. 19). This cord 30 can be disconnected for transporting by unscrewing the connector shell 150, described above, and pulling it apart, similar to an electrical connector. The umbilical cord 27 is constructed in the same manner, with the connectors 206 and 208 (FIG. 3) casing 207, arterial and venous blood tubings and air-carrying tubing 209. It will be understood that the connectors are constructed with a keying device, such as a pin, protruding from the male portion and received in a hole in the female portion (not shown), in order that after disassembly of the cords 26 and 30 they may be re-assembled in the same position.

The flow control unit 28 is housed in a suitable container 210 with panel 40 upon which the arterial bank of controls is indicated, as is the venous and the air controls. A lever 212 projecting through the panel 40 actuates the On-Off valve 213 which is mounted directly behind the panel 40, as best shown in FIGS. 19 and 20. This valve receives air through inlet 214 and if the lever 212 is in "On" position, air passes through exhaust tube 215 and into a needle valve 216 which has an adjusting knob 217 also protruding through panel 40 to control the quantity which passes out through a tube 218 to be ultimately delivered to any injury.

While the above description concerns the air controlled valves, the blood control valves are constructed and operate in the same manner with the exception that when valves 213 are banked together to form the arterial section and venous section, a side opening 220 is used to allow blood to flow into each adjacent valve, thereby requiring only one inlet 221 for the complete bank of arterial valves and one outlet 222 for the complete bank of venous valves. Opening or passage 220 is therefore a header communicating with each of the several arterial valves.

Opening 220 has plugs 230 at its ends for cleaning purposes. It will be noted from FIG. 3 that the moulage 116 is secured to the leg of the manikin by means of siraps 227 having complementary fastening means 228 and 229 at their ends. The mouth injury shown at 232 in FIG. 1 may be serviced in the same manner as earlier described with respect to the other injuries. Current is supplied to the unit 31 through cord and plug 225 and a switch 226 is used to turn the power on and off.

What I claim is:

1. A manikin for use in first aid training and comprising an articulated body comprising a torso, head, arms and legs which are independently pivotally movable to an adjusted, fixed position to simulate a lifelike appearance and provided with a plurality of simulated injuries, a reservoir for a fluid simulating blood and a group of tubes for delivering the fluid to the several injuries, a conduit connecting the reservoir with said tubes and providing a fluid circuit, a pumping unit in said fluid circuit for imparting differing types of flow to the fluid, a system of valves for discontinuing flow to any one of the injuries and for varying the amount of fluid delivered to each injury and a by-pass tube connecting the discharge side of the pumping unit with its reservoir.