Oct. 25, 1932. C. H. DAVIES 1,884,590

MOLD

Filed Aug. 15, 1931

FIG. I.

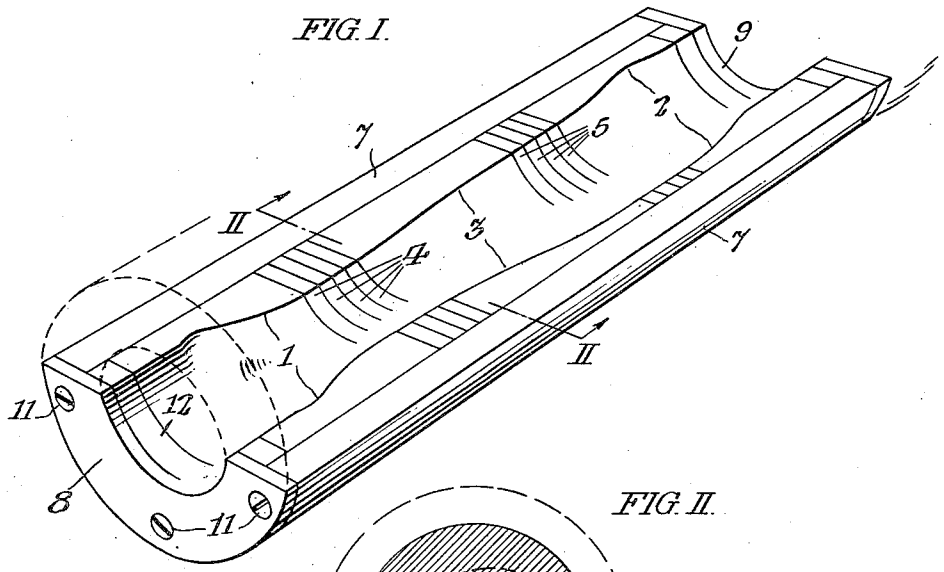


FIG. II.

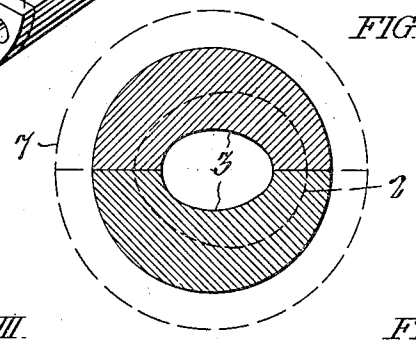


FIG. III.

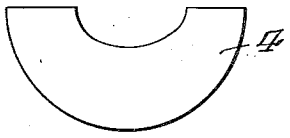


FIG. IV.

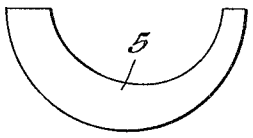


FIG. V.

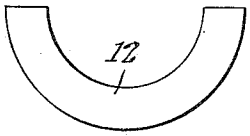
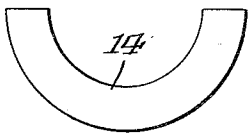


FIG. VI.



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UNITED STATES PATENT OFFICE

CHARLES H. DAVIES, OF PHILADELPHIA, PENNSYLVANIA

MOLD

Application filed August 15, 1931. Serial No. 557,275.

My invention is designed and adapted for the manufacture of artificial limbs which include thin shells of metal shaped to the configuration of natural limbs. Ordinarily, such shells are each made of primarily plane sheet metal hammered over a wooden or metal form of the limb to be imitated, and the edges of the sheet are trimmed and bent to abutting position and then welded or riveted. Such a method of construction requires an average of eight hours time of a skilled workman to produce an artificial shin shell of the extent between a knee and angle joint, which may be made in half an hour by the use of this invention. Attempts have been made to form such metal shells in molds but as no two natural limbs are alike, even in the same individual, the necessity and cost of forming each mold of the unique shape desired for one limb to be manufactured in it, more than offsets the saving of time by the use of the mold, instead of a hammer, and renders the cost of that method of manufacture commercially prohibitive. However, I found that natural limbs are substantially straight at short regions of their length, for instance, every normal leg is substantially straight for a short distance above the angle joint and for a portion of the calf. Therefore, I provide a mold which is formed in three sections; to wit, an end section which is a tapered, substantially conical, ankle section; an opposite end section which is a tapered, substantially conical, knee section; and an intermediate tapered, substantially conical, section; said sections fitting together to form a substantially smooth interior configuration of the shortest limb member which may be produced in the mold. I also provide a plurality of mold shim sections, one or more of which may be interposed between the other sections. I find it convenient to provide four such shim sections which are alike as to their interior configuration and each adapted to separate the adjoining tapered mold sections to the extent of one-half inch at the straight angle portion of the limb to be formed in the mold. I also provide four such shim sections which are alike as to their interior configuration and each adapted to separate the adjoining tapered mold sections to the extent of one-half inch at the straight calf portion of the limb to be formed in the mold. By employing one or more of said shim sections, I find that with a single mold thus constructed and arranged, I can form seventeen different lengths of artificial limbs matching natural limbs.

In the form of my invention hereinafter described, I find it convenient to employ a mold casing in which the various sections of the mold may be assembled and to provide ankle end shim sections and knee end shim sections so that said casing may be filled throughout its axial extent and the mold be of the same axial length, despite variations in the length of the artificial limb shell which is to be formed therein.

Such a mold, conveniently comprising oppositely counterpart semi-cylindriform mold sections and shims, is adapted for employment in my method of making artificial limbs by expanding seamless metal tubes therein by internal fluid pressure; which method and means therefor are claimed in my copending application (204–31) for Letters Patent of the United States, Serial No. 557,274 filed August 15, 1931. In that method of manufacture, the employment of the mold casing with the opposite end shim sections to fill the same permits the use of the same mold casing in connection with fluid inlet and outlet ports which register with the opposite ends of the mold casing in fluid tight relation therewith and remain the same distance apart in a hydraulic press.

My invention includes the various novel features of construction and arrangement hereinafter more definitely specified.

In said drawing; Fig. I is a perspective view of one-half of a mold structure embodying my invention.

Fig. II is a transverse sectional view of a complete mold including oppositely counterpart semi-cylindrical sections, such as indicated in Fig. I, taken on the line II, II.

Fig. III is an end elevation of one of the ankle shim mold sections indicated in Fig. I.

Fig. IV is an end elevation of one of the calf shim mold sections shown in Fig. I.

Fig. V is an end elevation of one of the foot end shim mold sections.

Fig. VI is an end elevation of one of the knee end shim mold sections.

In said figures; I have shown a die mold for forming a shin shell and including three tapered substantially conical sections, to wit. the ankle section 1, the knee section 2, and the intermediate section 3. Said sections may be fitted together axially to form a substantially smooth interior configuration of the shortest limb member which may be produced in the mold. However, I provide four ankle shim mold sections 4 which are alike as to their interior and exterior configuration, shown in Fig. III, and preferably each adapted to separate the adjoining tapered mold sections 1 and 3 to the axial extent of one-half inch at the straight ankle portion of the limb to be formed in the mold. I also provide four calf shim mold sections 5 which are alike as to their interior and exterior configuration, shown in Fig. IV, and preferably each adapted to separate the adjoining tapered mold sections 2 and 3 to the axial extent of one-half inch at the straight calf portion of the limb to be formed in the mold. As above noted; by employing one or more of said shim sections 4 or 5, or both, I can form seventeen different lengths of artificial shin shells matching natural limbs.

I prefer to employ a casing 7 for said mold sections, which is a diametrically split cylindrical tube having flange plates 8 and 9 detachably rigidly connected with its opposite ends, conveniently by screws 11, and to provide ankle end shim sections 12 of the configuration shown in Fig. V, and one of which is indicated in Fig. I, and knee end shim sections 14 of the configuration shown in Fig. IV, and one of which is indicated in Fig. I, so that said mold casing 7 may be filled throughout its axial extent and the mold be of the same axial length despite variations in the length of the artificial limb shell which is to be formed therein, and is adapted to fit in a hydraulic press for employment in the method of manufacture contemplated in my copending application aforesaid. However, it is to be understood that said casing is not an essential part of my sectional mold comprising tapered sections which are adapted to be variably employed to manufacture artificial limb shells of different axial length, as any selected group of the mold sections above contemplated may be secured in coaxial relation, by any convenient means, while the shell is being formed therein, and, although I prefer to use such a mold in conjunction with means for applying fluid pressure to the interior thereof to expand a preformed seamless tube therein; it is to be understood that such a mold may be otherwise utilized, for instance, the limb shell may be formed of cast metal poured into said mold.

However, an essential feature of my invention is that a plurality of main mold sections may be assembled in variable axial relation with auxiliary, spacing, mold sections between them so as to form articles of different axial length by the employment of the same main mold sections. Moreover, such a sectional mold may be provided with filler members other than the shim sections 12 and 14, either at both ends or solely at one end thereof.

Therefore, I do not desire to limit myself to the precise details of construction and arrangement herein set forth, as it is obvious that various modifications may be made therein, without departing from the essential features of my invention, as defined in the appended claims.

I claim:

1. A mold for forming articles of different axial length, including a plurality of main mold sections adapted to be adjustably axially separated, and a series of auxiliary mold sections of the same configuration each adapted to be inserted between adjoining main mold sections, for spacing said main mold sections and affording a smoothly continuous surface between them.

2. A mold for forming articles of different axial length, including three main mold sections adapted to be adjustably axially separated; means for holding said sections in cooperative relation, for affording a continuous surface connecting them, and auxiliary mold sections respectively adapted to be inserted between adjoining main mold sections, for spacing said main mold sections and affording a smoothly continuous surface between them.

3. A mold for forming articles of different axial length, including three main mold sections adapted to be adjustably axially separated; means for holding said sections in cooperative relation, for affording a continuous surface connecting them, and two series of auxiliary mold sections respectively adapted to be inserted between adjoining main mold sections, for spacing said main mold sections and affording a smoothly continuous surface between them; and a tubular casing for said main and auxiliary mold sections.

4. A mold for forming articles of different axial length, including three main mold sections adapted to be adjustably axially separated; means for holding said sections in cooperative relation, for affording a continuous surface connecting them, and two series of auxiliary mold sections respectively adapted to be inserted between adjoining main mold sections, for spacing said main mold sections and affording a smoothly continuous surface between them; and a tubular casing for said main and auxiliary mold sections having inwardly extending retaining flanges at its opposite ends, and filler means in said casing

including sections adapted to be inserted with said mold sections to fill said casing, axially.

5. A mold for forming articles of different axial length, including three main mold sections adapted to be adjustably axially separated; means for holding said sections in cooperative relation, for affording a continuous surface connecting them; and two series of auxiliary mold sections respectively adapted to be inserted between adjoining main mold sections, for spacing said main mold sections and affording a smoothly continuous surface between them.

In testimony whereof, I have hereunto signed my name at Philadelphia, Pennsylvania, this eighth day of August, 1931.

CHARLES H. DAVIES.