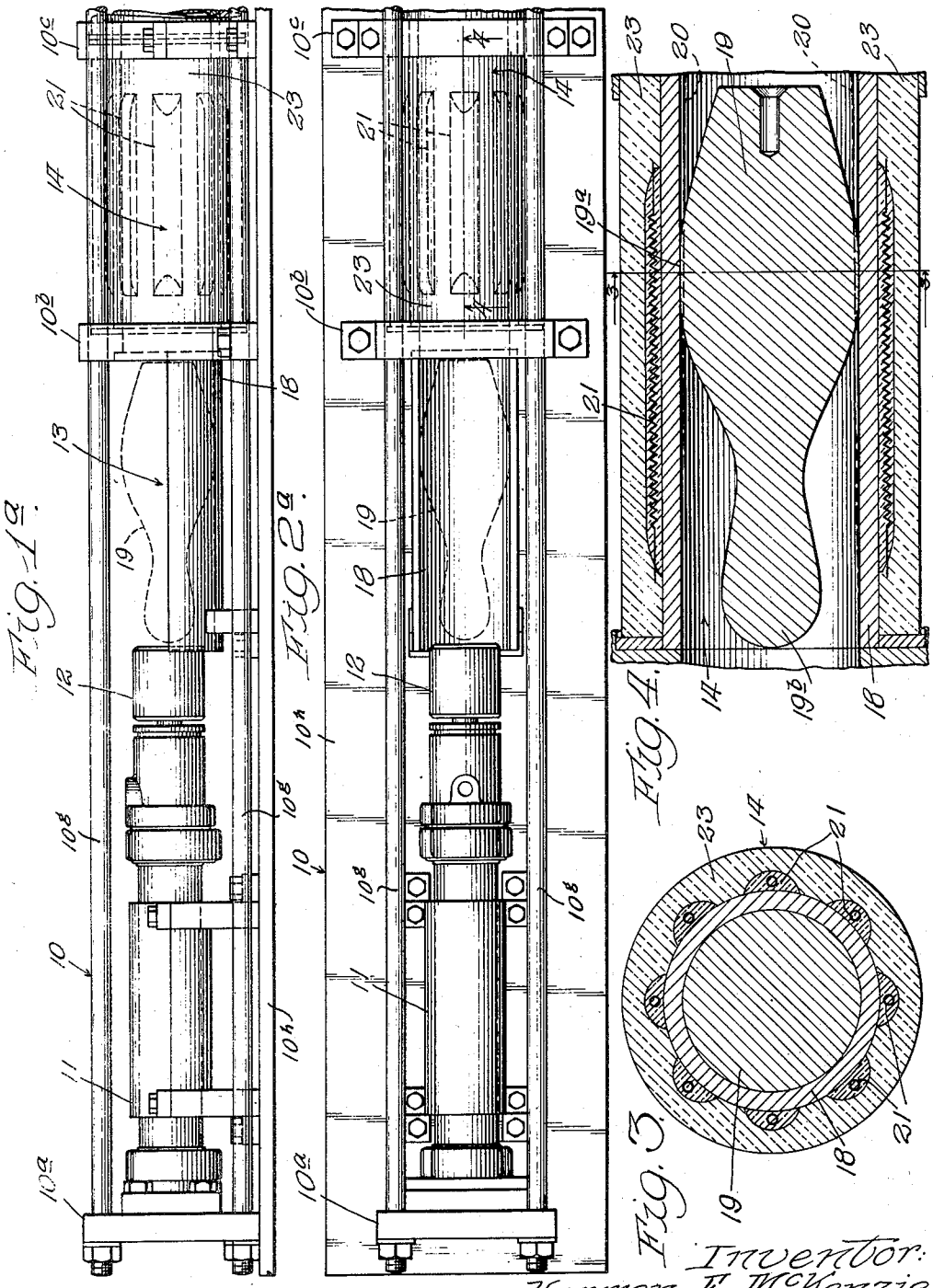
July 31, 1951 H. E. McKENZIE 2,562,807

BOWLING PIN HARDENING APPARATUS

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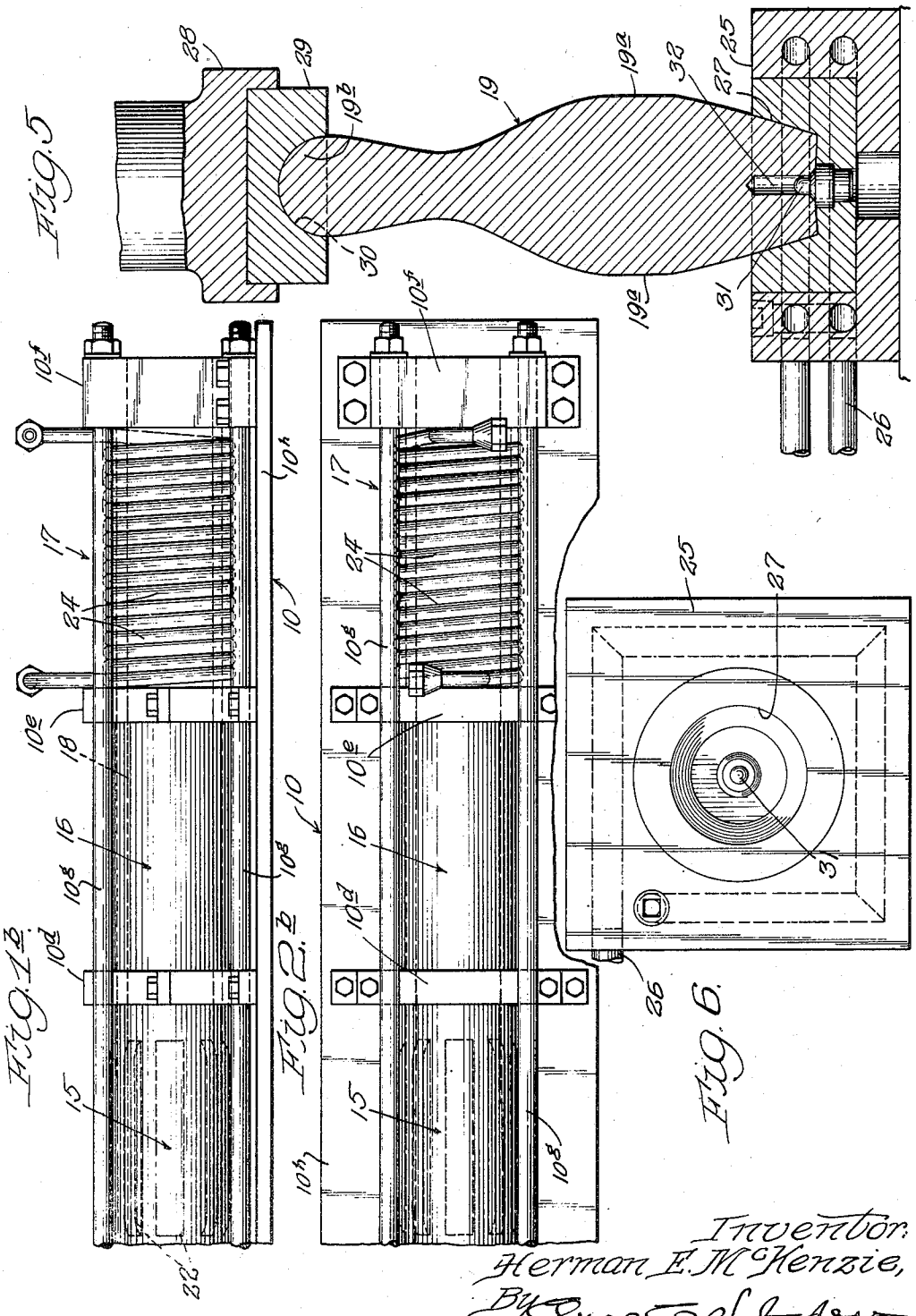


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BOWLING PIN HARDENING APPARATUS

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BOWLING PIN HARDENING APPARATUS

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3 Claims. (Cl. 144—2)

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The present invention relates to a novel apparatus and method for hardening bowling pins and particularly for hardening the end and "belly" portion of a wooden bowling pin.

Pins used in bowling are naturally subject to considerable forces resulting from being struck by the bowling balls and from being struck by other pins which have in turn been struck by the balls. The balls for the most part strike the pins at their widest portion, known as the "belly," and the pins in turn are propelled by the balls in such manner that either their base or "belly" portions will usually strike the "belly" portions of the adjacent pins. Bowling balls are, of course, thrown with considerable force and the impact of the ball hitting a pin and of the pin hitting the other pins is very great and, unless the two parts which are most frequently subjected to such impacts are very hard and tough, the life of a bowling pin is short.

It is an object of the present invention, therefore, to provide a novel apparatus for and method of hardening the belly portion and base of the pins. The present invention comprises an apparatus into which the pins, usually of maple, and made slightly wider at the belly and longer at the base than the regulation or desired width and length, are placed. The pins are subjected to high temperatures and then forced along a tube which tapers to a diameter less than that of the belly portion of the pin as originally formed. The pins are preferably then moved to another compartment where the compression continues but where heat is no longer applied so as to maintain and "set" the new contour and diameter produced by the heat and pressure, and then the pins are transferred to a cooling chamber from which they are manually removed and placed base down in a heated die, the base at that time being slightly greater than the die in which the pins are placed. A plunger, ram, or the like is directed against the top of the pin to force the base into the die where the base is compressed and hardened thereby.

Other objects and advantages will become apparent from the following detailed description taken in connection with the accompanying drawings, in which:

Fig. 1*a* and Fig. 1*b* together comprise a side elevational view of the device for hardening the belly portions of the pins.

Fig. 2*a* and Fig. 2*b* comprise a top plan view of the device shown in Fig. 1*a* and Fig. 1*b*.

Fig. 3 is a sectional view taken on the line 3—3 of Fig. 4.

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Fig. 4 is an enlarged sectional view taken on the line 4—4 of Fig. 2*a*.

Fig. 5 is a fragmentary sectional view of the base hardening device.

Fig. 6 is a top plan view of the die shown in Fig. 5.

While the invention is here shown and will hereinafter be described in a preferred embodiment, it is not intended that the invention is to be limited thereby to the specific construction disclosed. On the contrary it is intended to cover all modifications and alternative constructions falling within the spirit and scope of the invention as defined by the appended claims.

In the embodiment of the invention disclosed in the drawings, 10 represents an elongated cabinet or apparatus comprised of a plurality of plates 10*a*—10*f*, inclusive, connected together by rods 10*g* and mounted on a base 10*h* and provided at one end with a hydraulic, double acting cylinder 11 of well known type provided with a rod or ram 12. The balance of the device is divided into a number of chambers 13, 14, 15, 16 and 17. The chamber 13 is open at the top and contains one end of a tube 18 which extends from chamber 13 to and through chamber 17. In chambers 13 and 14 this tube is of substantially the same diameter as that of the initial form or blank of the bowling pin blank 19, the tube however being open at the top in chamber 13 to receive the bowling pin through the opening in the top of the chamber. The diameter of the tube remains the same in chamber 14 but in chamber 15 the tube tapers in the manner shown by dotted lines 20 in Fig. 4 (the dotted lines being shown in chamber 14 for clarity), and remains of the same diameter throughout the succeeding chambers. The chambers 14 and 15 are provided with electrical heating elements 21 and 22 connected to a suitable source of electricity and adapted by means of a suitable thermostat to maintain the temperature in the chamber between 320° F. and 350° F. Insulation 23 of suitable material provides side walls for the chambers 14—16, inclusive. No heating means is used in chamber 16 but chamber 17 is provided with cooling coils 24 adapted to receive any well known cooling material, such as water, brine, or the like. The end of the machine, on the right as viewed in Fig. 1*b* and Fig. 2*b*, is provided with a suitable spring pressed closure (not shown) through which the pins may be delivered.

The pins are placed by hand or by any suitable mechanical means into the tube in chamber 13 with the tops of the pins placed adjacent the

rod or ram 12 of the hydraulic cylinder. The cylinder then acts to push the pin longitudinally into chamber 14 and then returns to its initial position and another pin 19 is placed in the chamber 13. The ram again acts to force the second pin into the heating chamber 14 and thereby forces the first pin into the chamber 15 where, having been heated in chamber 14, it is also compressed by reason of the reduction in the size of the tube 18 to form a slightly flattened belly portion 19a as seen in Fig. 5. The next pin, upon being placed in chamber 13, will be forced by the rod 12 into the chamber 14 and will push the two preceding pins ahead of it. The first pin is now in the chamber 16 which is not heated but where it remains in compressed shape, due to the restricted size of the tube 18, and then when the next pin is placed in the chamber 13 the first pin will be forced into the chamber 17 where it is cooled and then upon the next movement of the rod 12 against pin 19 in chamber 13 will be forced out the door of the cooling chamber.

It is then picked up and placed base downward in the die 25, which may be heated as by steam pipes 26 and which is provided with a well 27 of substantially the same contour as the base of the bowling pin 19, but of slightly smaller size, so as to receive such pin snugly therein. Above the die is a plunger 28 provided with a die member 29 having a well 30 of substantially the same shape and dimension as the top 19b of the bowling pin. A suitable source of power (not shown) is connected to and operates the plunger. This die gradually descends until the head of the pin is received in the well 29 and then continues to apply pressure downwardly whereby the base of the pin, due to such pressure and the heat in the die 25, is compressed and hardened on the bottom and edge.

The well 27 in the die 25 is preferably provided with a projection 31 adapted to receive the usual opening 32 in the base of the pin which is formed there for the purpose of permitting the pin to be set on a bowling alley by a mechanical means provided with a centering pin, such means being well known in the art.

The hydraulic cylinder 11 is adjusted so that the rod 12 is reciprocated every thirty seconds which means that each pin remains in each chamber that length of time. While I have shown a receiving chamber, a heating chamber, a heating and compression chamber, a "setting" chamber, and a cooling chamber, it is obvious that the device may readily, if desired, be provided with additional chambers for applying heat and pressure and that the period of time during which the pin remains in each chamber may be varied by adjustment of the hydraulic cylinder. It is usually not necessary to harden the base of the pin as much as the belly portion, a period of five seconds being sufficient to harden the base the desired amount.

I claim as my invention:

1. A device for hardening a bowling pin belly comprising an elongated cabinet provided, successively, with a heating chamber, a heating and pressure chamber, an unheated chamber and a cooling chamber, a tube extending through said chambers, said tube in said heating chamber having a diameter substantially the same as the bowling pin as originally shaped, said tube being tapered to a smaller diameter in the other chambers, and means for forcing a pin successively through said chambers.

2. A device for hardening a bowling pin belly comprising an elongated cabinet provided, successively, with a heating chamber, a heating and pressure chamber, an unheated chamber and a cooling chamber, a tube extending through said chambers, said tube in said heating chamber having a diameter substantially the same as the bowling pin as originally shaped and said tube being tapered to a smaller diameter in the successive chambers, and means including a ram for forcing a pin successively through said chambers.

3. The device of claim 2 wherein each of said chambers is approximately as long as said bowling pin.

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