April 15, 1941. A. F. LARABEE 2,238,119

BALL-COVERING MACHINE

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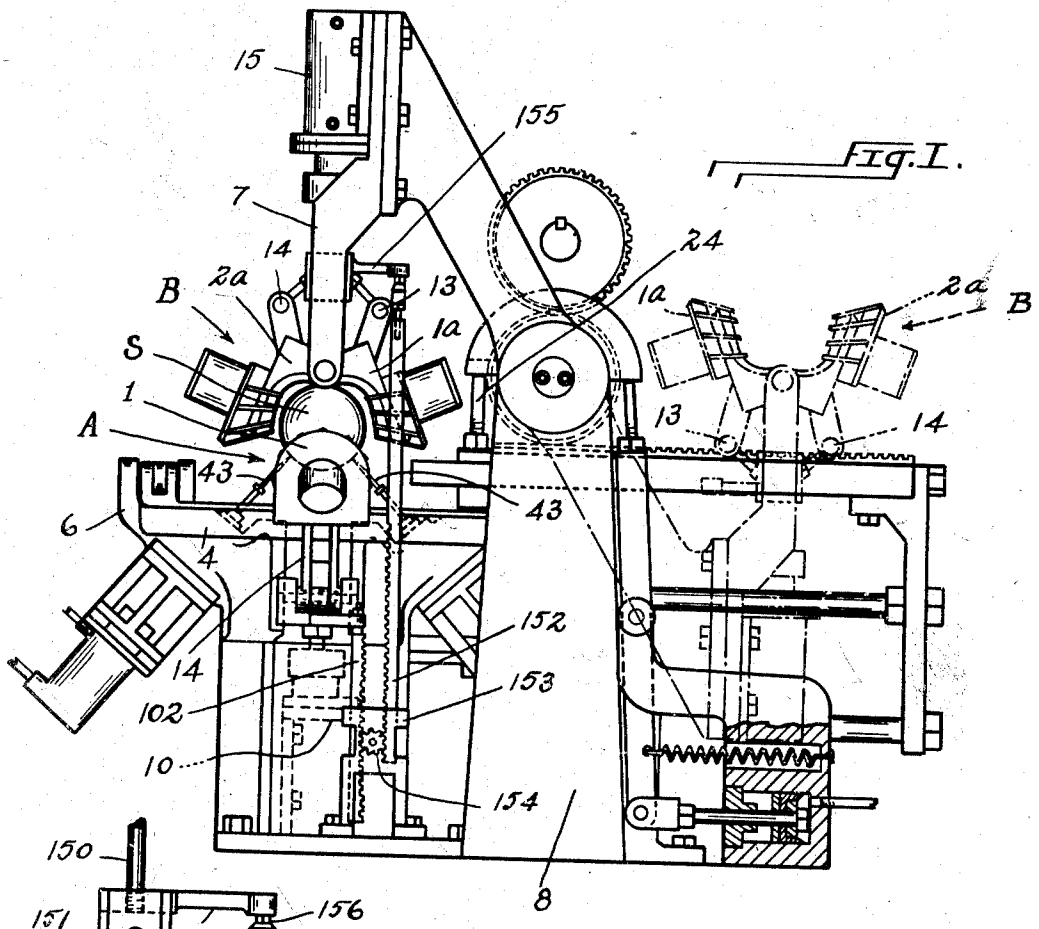


Fig. I.

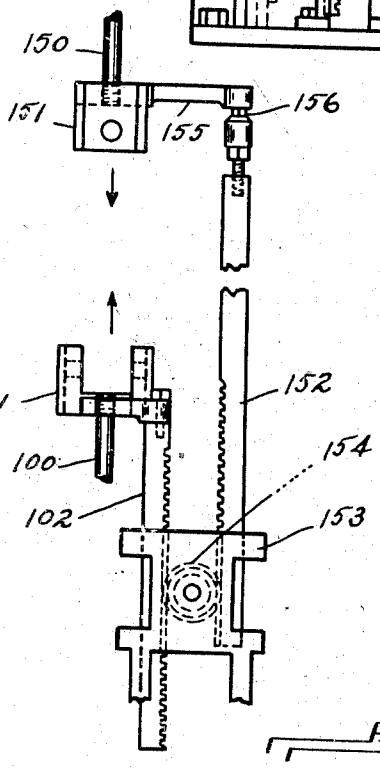


Fig. II.

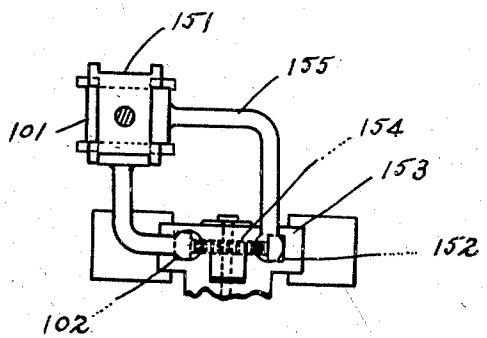


Fig. III.

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BALL-COVERING MACHINE

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2 Claims. (Cl. 154—16)

This invention relates to machinery for covering playing balls, and finds practical application in machinery for applying the coverings of felt cloth to the rubber shells of tennis balls.

In an application for Letters Patent of the United States filed November 13, 1939, Serial No. 304,071, the applicant, Archibald C. Bowers, has described and claimed a machine of such sort; and my present invention is found in improvement of the structure in detail.

In the accompanying drawing Fig. I is a view in side elevation of a machine in whose structure is included the improvement of the present invention; Figs. II and III are analytic views in side elevation and in plan from above of the detail that constitutes such improvement.

The machine includes two press members, A and B, consisting each of two blocks 1 (1*a*, 2*a*) of spherical concavity, hinged together, and capable of swinging upon their hinged connections between the open position shown in Fig. I and the closed position of snug engagement upon the contained ball. The spherical curvature of the concavities of the blocks is that of the covered ball. The peripheral outline of the concave face of each block is exactly that of the duplicate cover parts of Cassinian outline, so that, when the cover parts are shaped within the concavities and the blocks are closed upon the rubber shell of the ball, the cover parts form a complete and continuous cover upon the spherical outer surface of the ball. The line of division of the two halves of each press member is that of the minor axis of the Cassinian outline to which the applied cover part is shaped.

The blocks of the press part A are pivotally mounted in a standard 6; those of the press part B are pivotally mounted upon a carrier in the form of an arm 7, which arm 7 in turn is pivotally mounted upon a standard 8.

In operation the arm 7 swings in its pivotal mounting between the positions indicated in full and in dotted lines in Fig. I. When the arm 7 is in the dotted-line position and the two blocks of the press part B are open (as in Fig. I they are shown to be), the blocks of press part A correspondingly are in open position. The two blanks of felt fabric that together make up the complete cover of a ball are applied to the two blocks when the arm 7 is in such dotted-line position and the two press members are open. The rubber spherical shell S to be covered is then brought to position immediately above the open press part A where it is sustained upon fingers 43. In the sequent operation of the machine the arm 7 swings counter-clockwise from the dotted-line to the full-line position, Fig. I, and the blocks of the two press parts close. As they close, the fingers 43 recede, leaving the shell S supported and carried by the cover-applying press parts. After their initial closure the press parts open and close again upon the now covered ball.

It will be observed of the two press parts A and B that when in position to receive the cover blanks (the dotted-line position of press part B, Fig. I, and the full-line position of press part A) these press parts are extended horizontally and their open concave faces are accessible from above for application of the cover blanks. Such manifestly is the advantageous position, facilitating the progress of work upon the machine. When, however, the arm 7 has swung, and the two press parts are in the cooperative positions shown in full lines, and the hinged blocks of the two press parts close and open upon the contained ball, the concavity of the press part B is turned and is directed downwardly.

I have found that in the operation of the machine, lacking the feature of my present invention, the tendency exists to produce balls whose covers are at the seam where the two cover parts meet slightly one-sided: one of the two cover parts is spread slightly more than the other, and the second is compressed slightly more than the first. I have discovered that the difficulty, such as it is, is due to the positions of the two press parts at the time of closure. They close, by intent, simultaneously, under the propulsion of the pistons in two pneumatic cylinders 10 and 15; but, whereas, in the case of press part B, the weight of the component blocks 1*a* and 2*a* is cumulative upon the thrust of the piston to expedite closure, in the case of press part A, the thrust of the piston has to overcome the opposition of gravity, tending to hold the blocks in open and extended position. In consequence, press block B is effective in closing slightly in advance of press block A, and to this inherent condition as the source I have traced the slight irregularity that manifests itself in the product.

The invention lies in corrective means that have effect in eliminating gravity as a disturbing factor in press-block operation.

Fig. I shows in full lines the two press parts in co-operative position, for closing simultaneously upon a contained ball. The closing and opening movements of the blocks of the two press parts are effected by the strokes of the pistons within the two pneumatic cylinders 10 and 15. Cylinder 10 is mounted in the bed of the machine; cyl-

inder 15 is carried with the press part B in arm 7. The stems 100 and 150 of the pistons that move within the two cylinders 10 and 15 carry severally blocks 101 and 151; and the component blocks 1 (1a, 2a) of the two press parts A and B, pivoted in the one case to the standard 6 and in the other to the arm 7, are connected part by part by toggle connections 13, 14 to the blocks 101 and 151; and, in consequence, as the pistons reciprocate within the cylinders 10 and 15 (the parts being in the positions shown in Fig. I), the press parts are closed and opened.

Two racks 102 and 152 are carried in a casing 153 that is mounted on the bed-plate of the machine. They are arranged in parallelism, they extend vertically, their teeth are oppositely arranged, and they are simultaneously engaged by a gear-wheel 154 that is journaled in the casing 153. Rack 102 is united with the block 101 upon piston rod 100, and moves with it. The block 151 upon piston rod 150 carries an extension 155 which as the arm 7 swings from the dotted-line position, Fig. I, to the full-line position comes precisely to abutment upon the upper end of rack 152. The range of the swing of arm 7 is defined by a stop 24; and, to effect precision of abutment of extension 155 upon rack 152 the rack is equipped with a telescopic and minutely adjustable tip 156.

By such rack-and-pinion connection between blocks 151 and 101, the weight that otherwise tends to expedite the descent of piston rod 150 is made equally effective upon the ascent of piston rod 100; gravity as a disturbing factor is eliminated; and the product of the machine possesses the desired symmetry in the seam of the cover.

I claim as my invention:

1. In a machine for applying to a ball two complementary cover parts of Cassinian outline that includes two press parts each consisting of a plurality of hinged-together blocks adapted to open and close upon a contained ball, a carrier in which one of said press parts is mounted, by the movement of which carrier the part mounted in it is brought from a remote position to a position of co-operation with the other part, means for synchronizing the closing movements of the blocks of the two said press parts, such means including two racks severally connected to the two press parts and a gear wheel simultaneously engaging the two racks, the carrier-borne press part coming to operative connection with its appropriate rack as the arm comes to such position of co-operation.

2. In a machine for applying to a ball two complementary cover parts of Cassinian outline that includes two press parts, each consisting of a plurality of hinged-together blocks adapted to open and close upon a contained ball, each press part having associated with it an operating cylinder and toggle connection between the piston of the operating cylinder and its hinged-together blocks, a carrier in which one of said parts with its operating cylinder is mounted, by the movement of which carrier the press part mounted in it is brought from remote position to a position of co-operation with the other part, means for synchronizing the closing movements of the blocks of the two said press parts, such means including two racks reciprocable in parallelism and a gear wheel simultaneously engaging said racks, one of said racks being connected to the piston of one of the cylinders and the piston of the carrier-borne cylinder coming to abutment upon the other rack as the carrier comes to such position of co-operation.

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