

No. 637,372.

Patented Nov. 21, 1899.

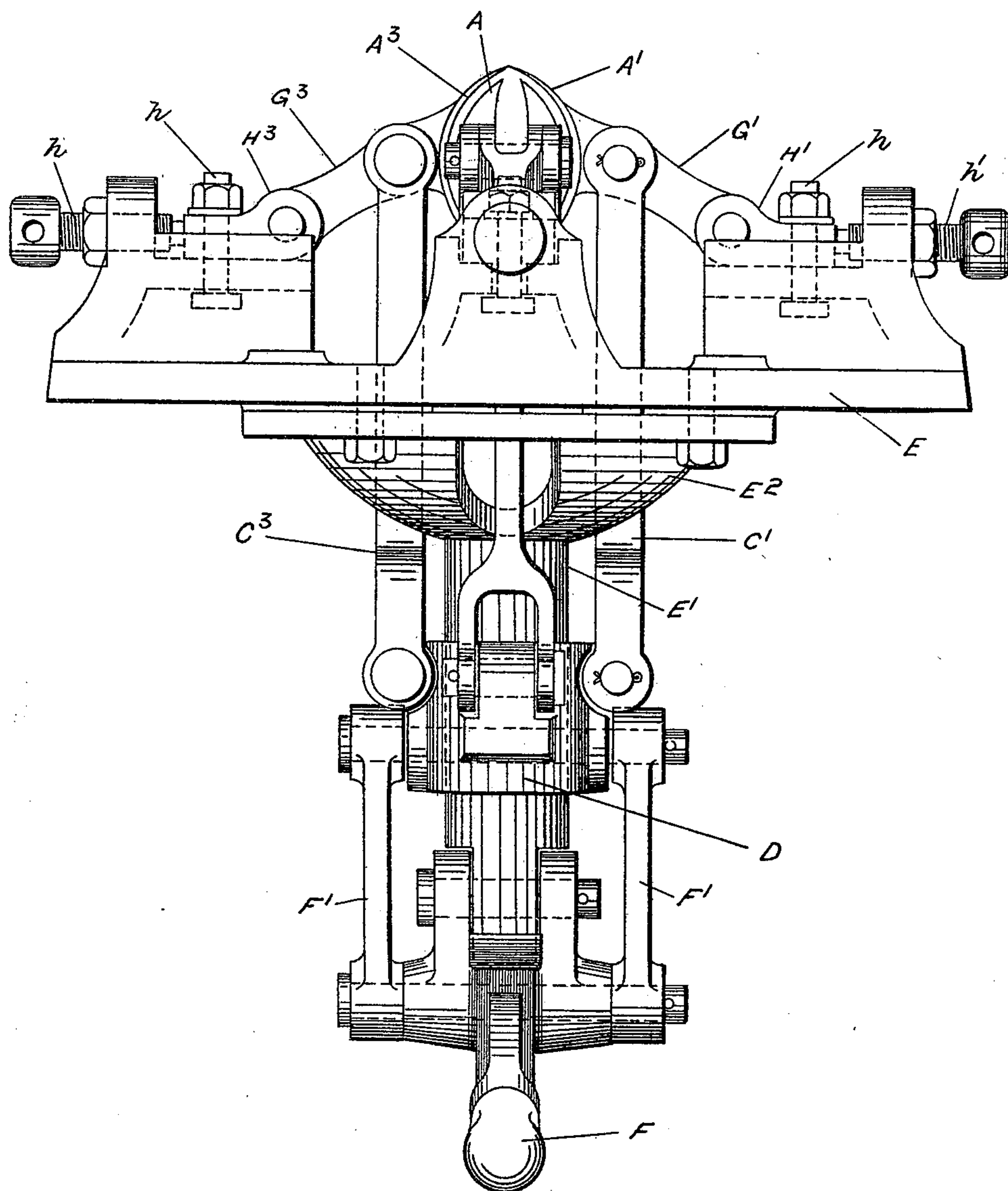
W. H. COX.  
BALL MAKING MACHINE.

(Application filed Nov. 13, 1897.)

(No Model.)

4 Sheets—Sheet 1.

FIG. 1.



WITNESSES.  
*Ella L. Giles*  
*Oliver*

INVENTOR  
*William Henry Cox*  
BY  
*Richardson*  
ATTORNEYS

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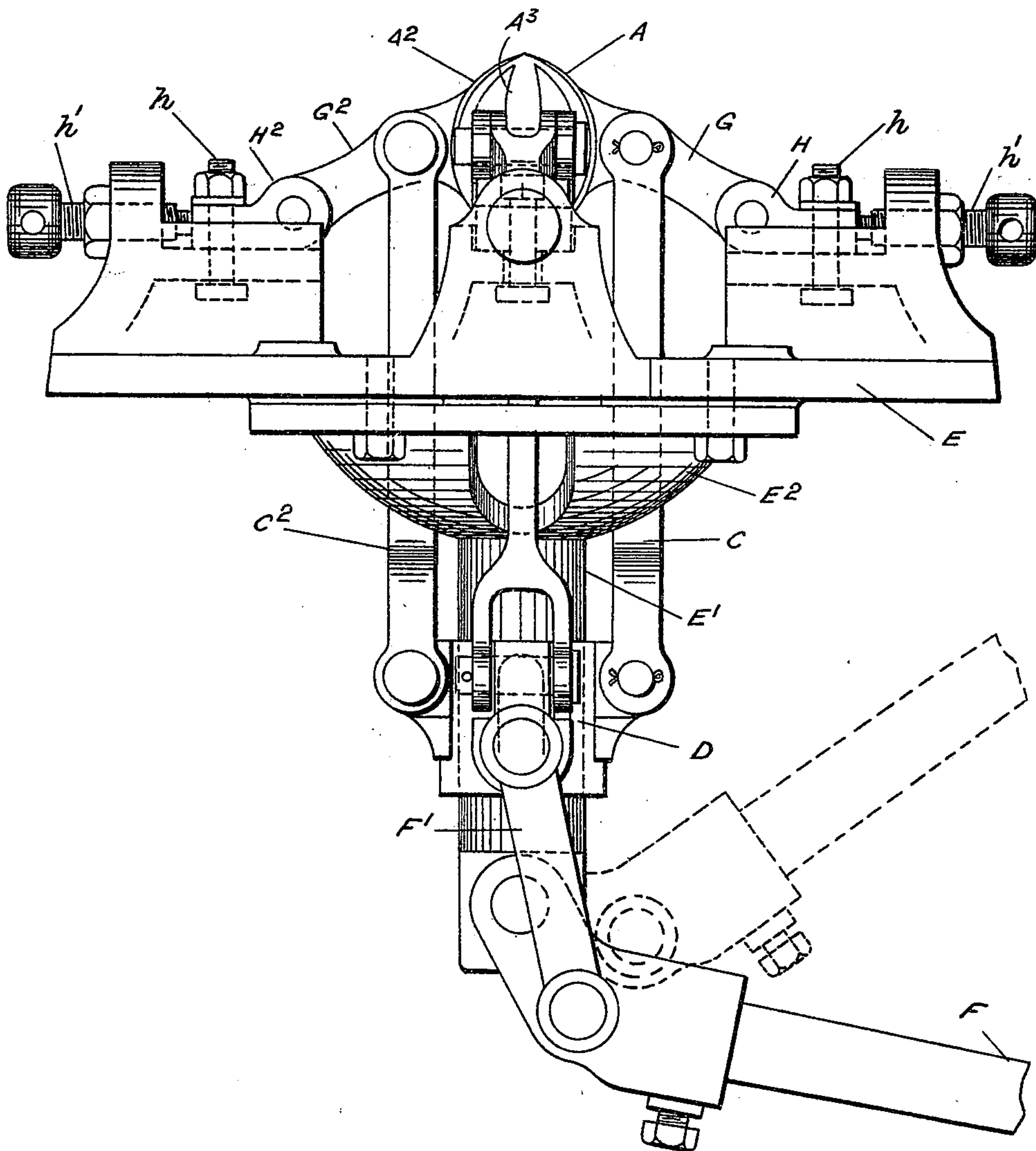
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4 Sheets—Sheet 2.

FIG. 2.



WITNESSES.  
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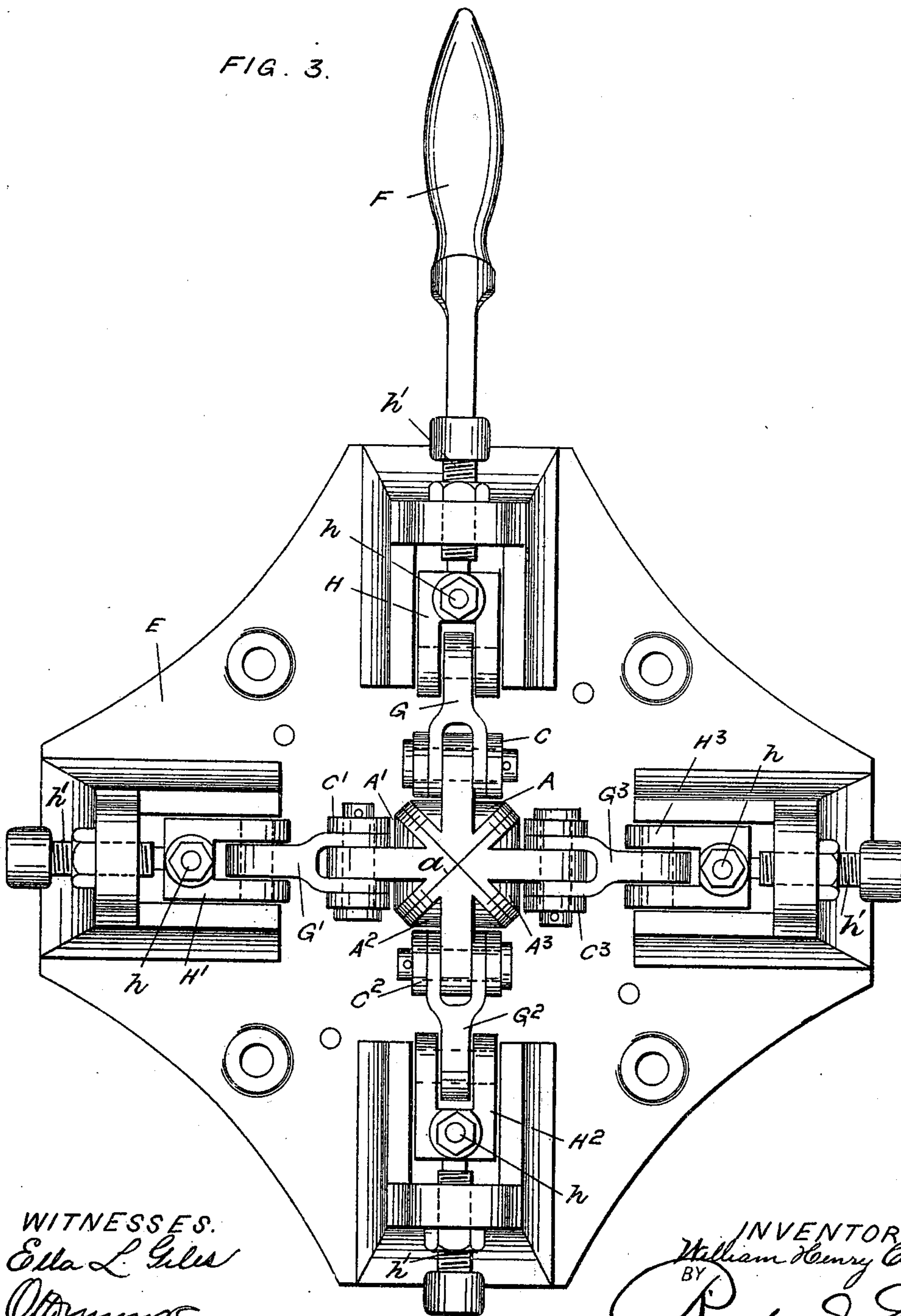
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4 Sheets—Sheet 3.

FIG. 3.



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4 Sheets—Sheet 4.

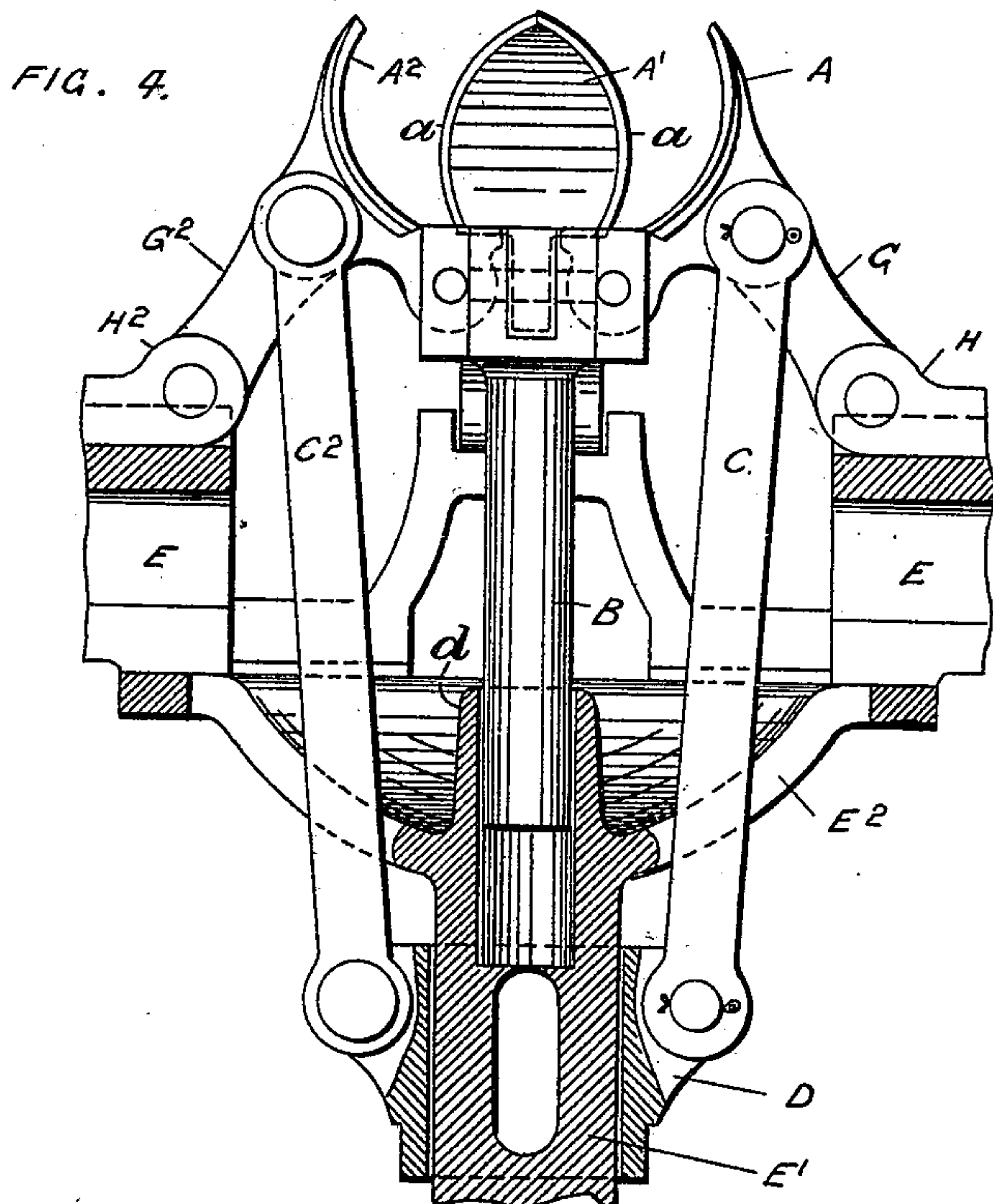


FIG. 6.

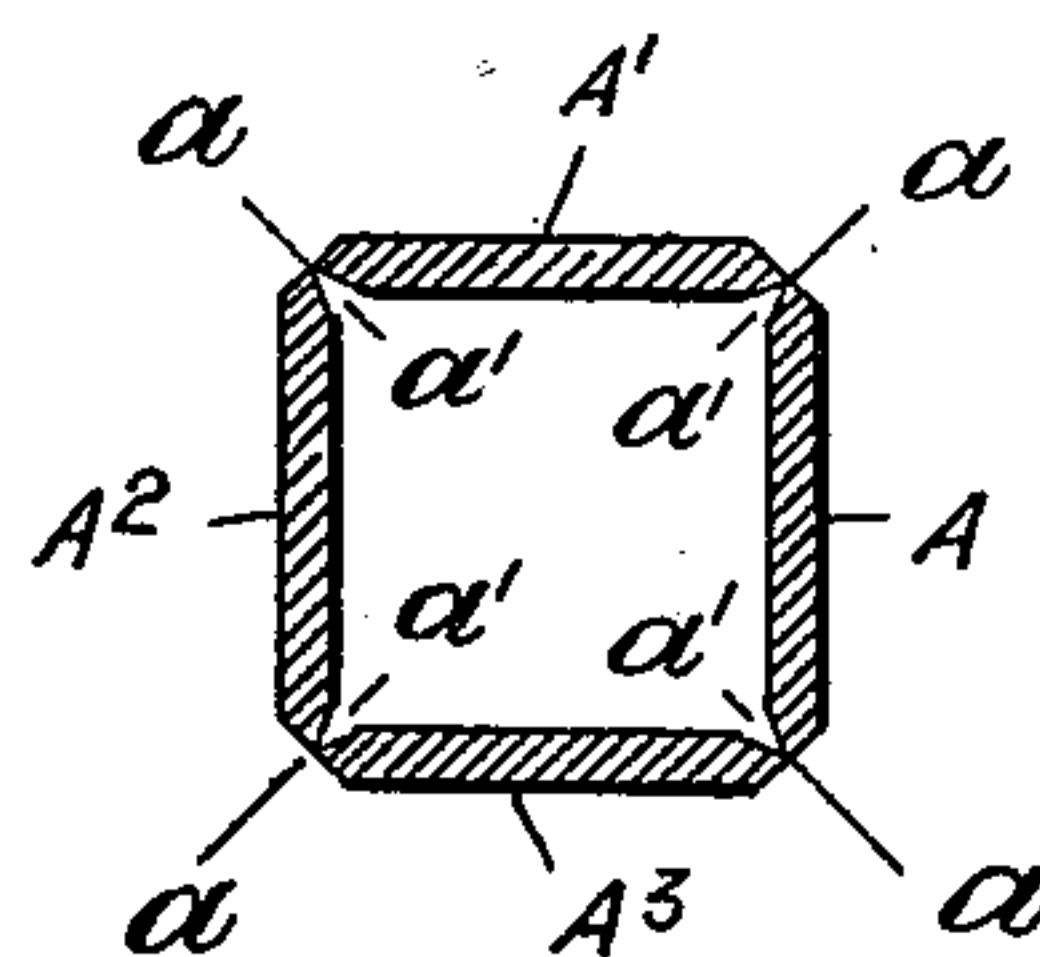
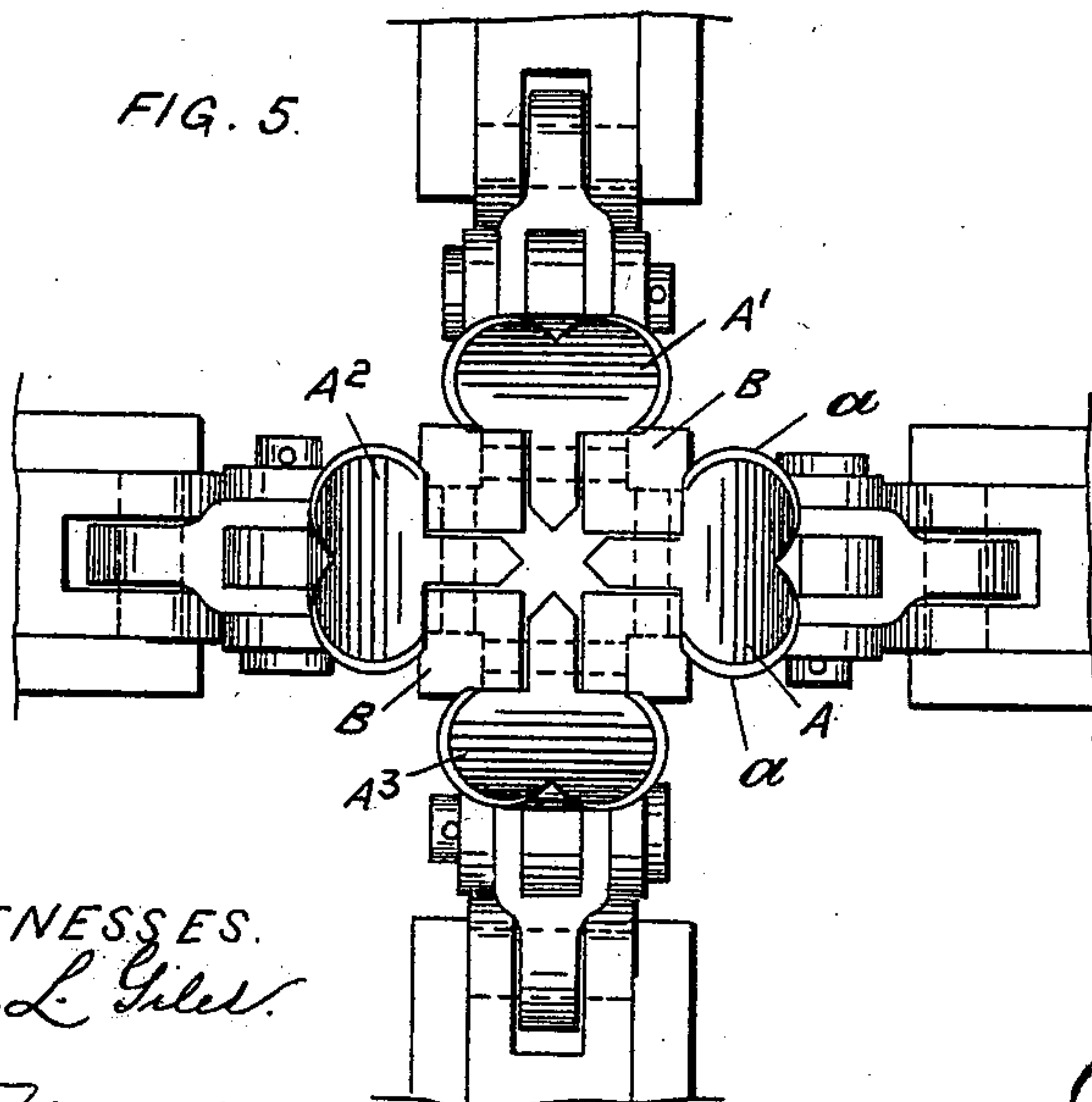


FIG. 5.



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# UNITED STATES PATENT OFFICE.

WILLIAM HENRY COX, OF MANCHESTER, ENGLAND, ASSIGNOR TO THE  
ECCLES RUBBER AND CYCLE COMPANY, LIMITED, OF ECCLES, ENGLAND.

## BALL-MAKING MACHINE.

SPECIFICATION forming part of Letters Patent No. 637,372, dated November 21, 1899.

Application filed November 13, 1897. Serial No. 658,469. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM HENRY COX, a subject of the Queen of Great Britain, residing at Chorlton-on-Medlock, Manchester, England, have invented certain new and useful Improvements in Ball-Making Machines, of which the following is a specification.

The invention has been patented in the following countries: Great Britain, No. 13,235, dated May 28, 1897; Belgium, No. 131,446, dated October 22, 1897; France, No. 271,486, dated October 20, 1897; Switzerland, No. 15,593, dated October 25, 1897; Italy, No. 90/180, dated December 31, 1897; Spain, No. 21,710, dated December 21, 1897; Austria, No. 47/4,504, dated November 2, 1897; Norway, No. 6,395, dated December 11, 1897; Sweden, No. 9,220, dated December 13, 1897; Canada, No. 59,711, dated April 21, 1898, and Hungary, No. 11,586, dated December 20, 1897.

This invention relates to a machine for making hollow caoutchouc balls.

By the said machine a single sheet of unvulcanized caoutchouc is primarily formed into a hermetically-sealed bag by gathering up the edges of the sheet, cutting away the superfluous caoutchouc, and nipping the severed edges together. The bag thus produced is subsequently vulcanized and distended in the known manner to form a spherical ball.

Figure 1 is a front view, Fig. 2 a side view, and Fig. 3 a plan, of the above-referred-to machine. Figs. 4 and 5 show the machine opened and ready to receive a sheet of caoutchouc, Fig. 4 showing parts in section. Fig. 6 is a detail.

A A' A<sup>2</sup> A<sup>3</sup> are four inwardly-curved and pointed plates, which will herein be termed "petals," forming when closed together four sides of a chamber, as shown in Figs. 1, 2, and 6. Within this chamber the aforesaid caoutchouc bag is formed. The petals A are hinged to the square-topped plunger B and are spread out and closed, as follows: Attached to the petals A are four rods C C' C<sup>2</sup> C<sup>3</sup>, whose lower ends are jointed to a cross-head D, adapted to slide vertically upon a stem E', which is attached by a flange E<sup>2</sup> to the bed-plate E. The cross-head is moved up and down by the hand-lever F, fulcrumed on the stem E' and coupled to the cross-head by the

links F'. The petals A are yoked by the links G G' G<sup>2</sup> G<sup>3</sup> to the adjustable stop-blocks H H' H<sup>2</sup> H<sup>3</sup>, which are secured to the bed-plate E by the bolts h. By slackening the bolts h the blocks H may be adjusted in their seats by the set-screws h' in order that the petals may meet accurately. The plunger B works in the socket d. Therefore when the hand-lever is raised to the position indicated in Fig. 2 the cross-head D and rods push the plunger B into the raised position shown in Fig. 4. During this action the yokes G pull the petals A apart, so that they assume the outspread position shown in Figs. 4 and 5.

It will be seen on reference to Figs. 4, 5, and 6 that the petals A possess a sharp cutting edge a, which edges are beveled, so as to form when they abut four wedge-shaped spaces a', Fig. 6.

The petals A are spread out, as in Figs. 4 and 5, by raising the lever F. A sheet of unvulcanized caoutchouc which has been previously coated on its upper surface with an adhesive cement is then pressed within the outspread petals and so that the edge of the sheet projects slightly above the petals. There is now placed on the caoutchouc a pellet of sodium carbonate or other chemical which will evolve a gas upon being heated for the known purpose hereinafter appearing. The lever F is then depressed, so as to close the petals A upon the caoutchouc, which they embrace. In this action the petals pucker and gather together the caoutchouc sheet, and finally as their edges a meet they cut off the superfluous caoutchouc and simultaneously the severed edges are nipped in the spaces a', formed by the beveled edges of the petals, so that the adhesive solution on the sheet effects a hermetical joint. The petals are then opened and the hollow caoutchouc bag is removed.

The shaping and cutting of the caoutchouc-sheet and the cementing together of the severed edges are thus effected in the one operation of closing the petals A.

The caoutchouc bags thus produced are transformed into spherical vulcanized balls in the known manner—namely, they are placed in iron molds having spherical cavities and subjected to heat, whereby the balls are vul-



canized. Such heat causes the chemical substance previously placed in the bag to evolve a gas, the pressure of which forces the caoutchouc bag against the wall of the cavity and  
5 so produces a spherical ball. The removal of such gas and substitution of air under pressure are effected in the known manner.

The machine may be power or hand driven.

The number and shape of the petals will  
10 vary with varying requirements.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In combination in a ball-forming machine, a series of petals pivotally supported  
15 to fold toward each other and adapted to receive the sheet of caoutchouc between them, said petals having their meeting edges adapted to cut the material and means for moving  
20 the petals, substantially as described.

2. In combination, the series of petals pivoted at their lower ends and adapted to fold toward each other, said petals having cutting  
25 edges *a* and beveled portions *a'* to cut the material and to press the edges thereof to-

gether, the said beveled portions presenting a space flaring inwardly from the edge *a*, substantially as described.

3. In combination, the hinged petals, the plunger to which the petals are connected, 30 the links *G* connected to the petals, the adjustable stop-blocks *H* to which the links are pivoted and means for moving the plunger, substantially as described.

4. In combination, the petals, the plunger 35 to which they are pivotally connected, the stop-block *H* adjustably supported on the frame, the links *G* connecting the petals and stop-block, a stem *E*, a bed-plate to which the stem *E* is connected, a cross-head *D* moving 40 on the stem, the rods *C* connecting the cross-head with the plunger, and means for moving the cross-head, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

WILLIAM HENRY COX.

Witnesses:

HAROLD WORSLEY,  
THOMAS LOMAX.