

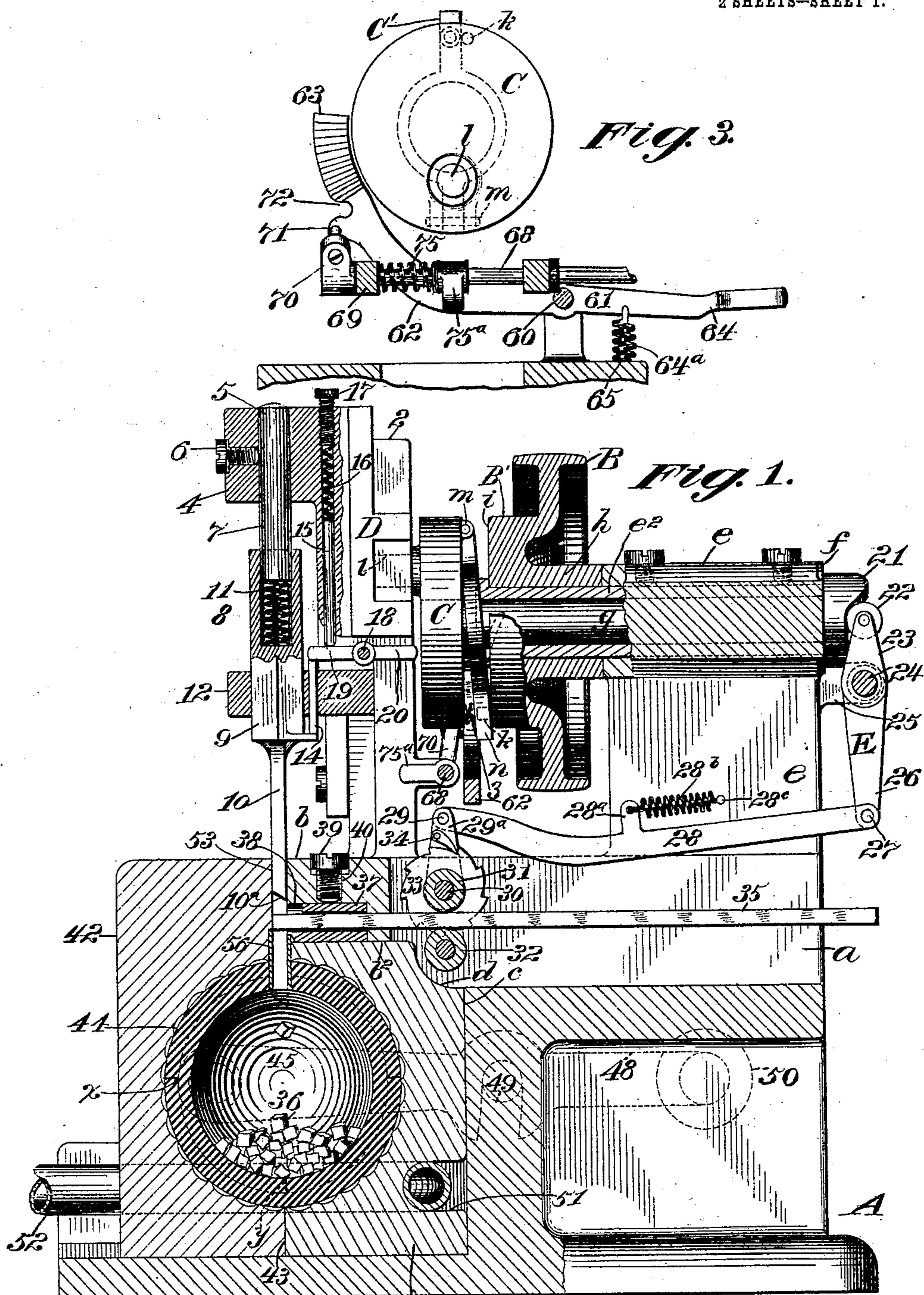
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PATENTED AUG. 13, 1907.

F. H. RICHARDS.  
PROCESS OF MAKING PLAYING BALLS.

APPLICATION FILED OCT. 24, 1902.

2 SHEETS—SHEET 1.



Witnesses: 41  
Frederick C. Feigler  
E. Everett Ellis

Inventor:  
F. H. Richards.

No. 863,448.

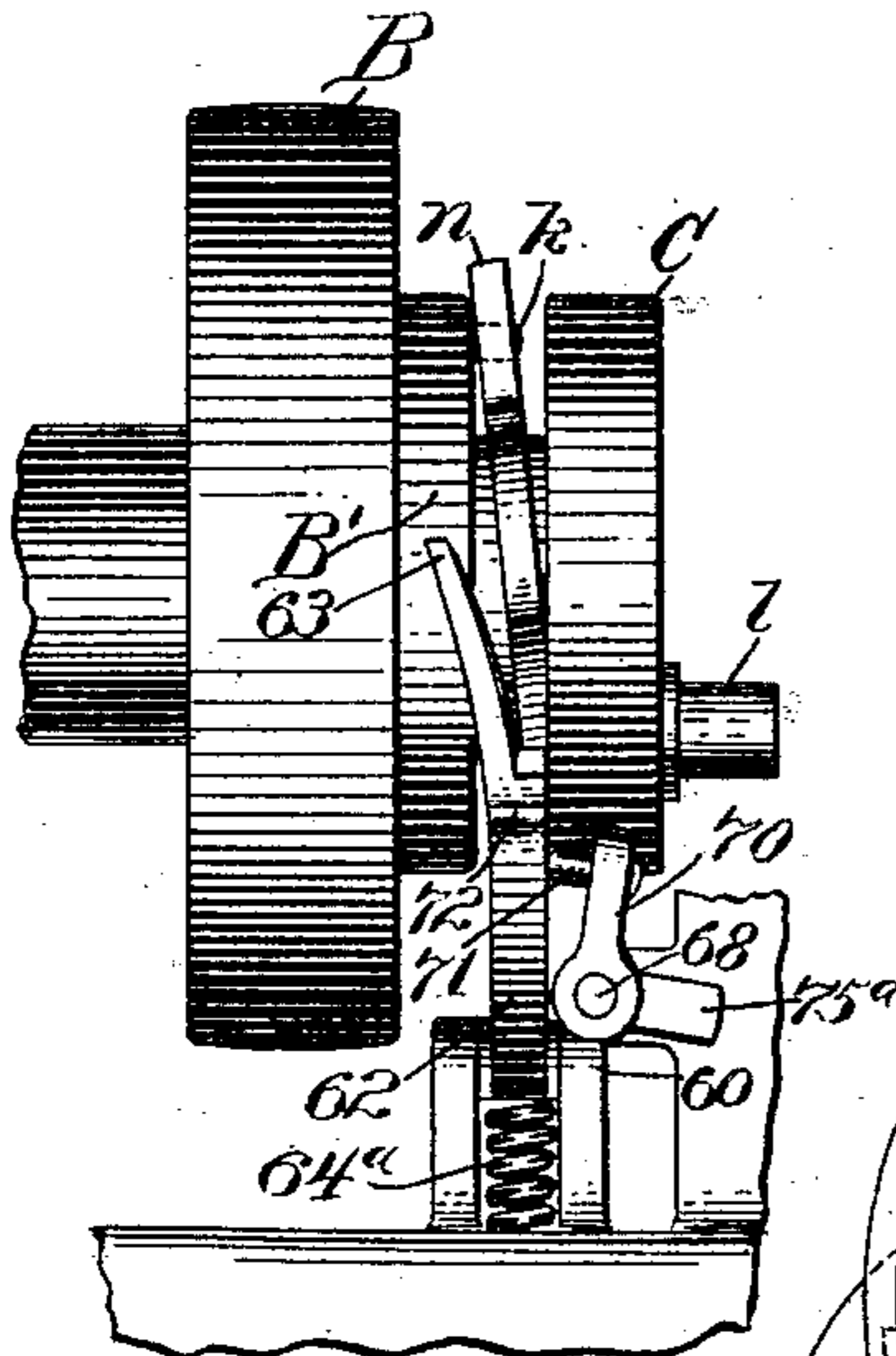
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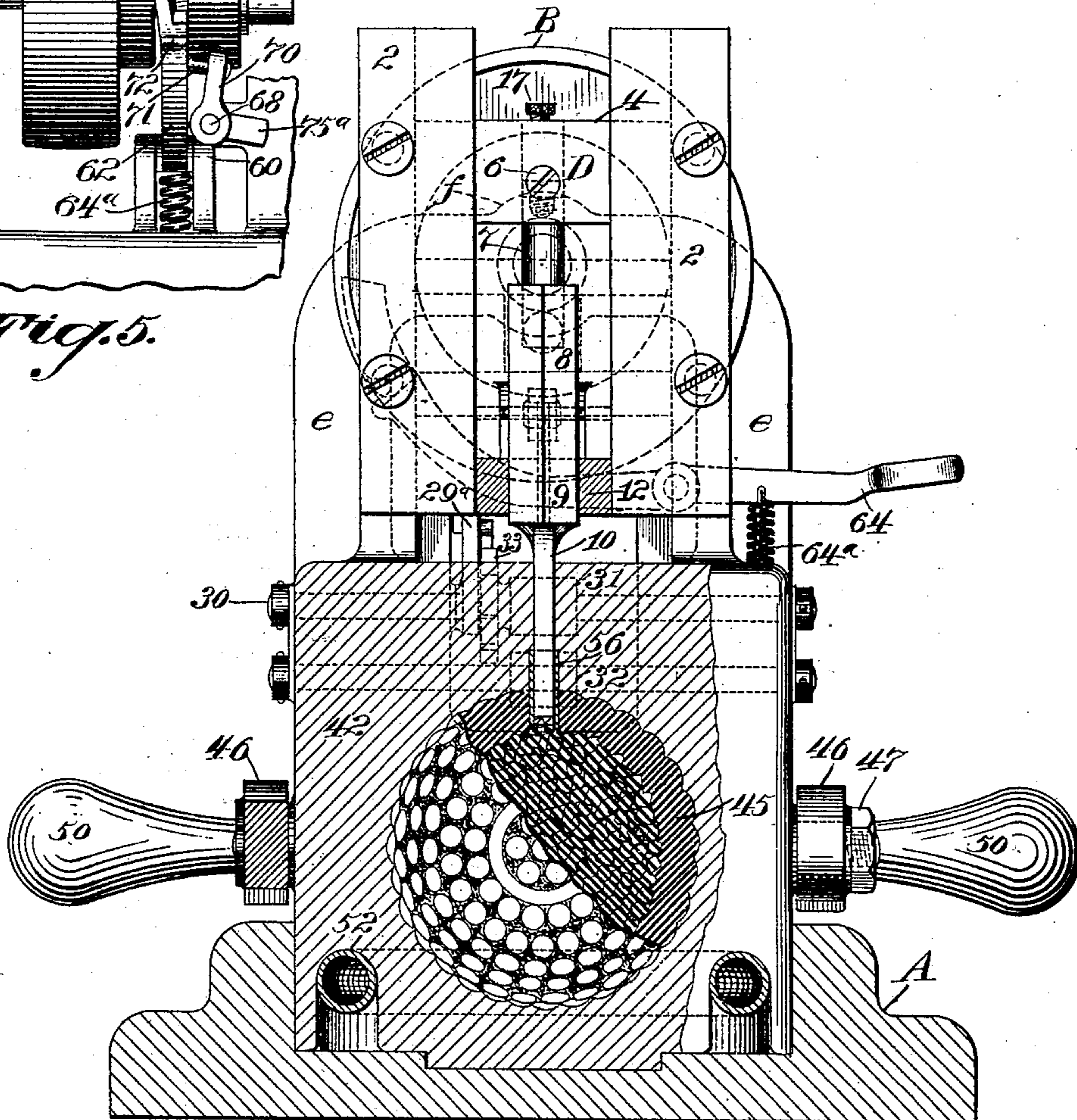
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2 SHEETS—SHEET 2.

*Fig. 4.*



*Fig. 5.*



*Fig. 2.*

Witnesses:  
E. C. Ellis  
Fred. E. Maynard.

Inventor:  
F. H. Richards.

# UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT.

## PROCESS OF MAKING PLAYING-BALLS.

No. 863,448.

Specification of Letters Patent.

Patented Aug. 13, 1907.

Application filed October 24, 1902. Serial No. 128,529.

*To all whom it may concern:*

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Processes of Making Playing-Balls, of which the following is a specification.

This invention relates to playing balls, and to method and means for making the same; and it consists substantially in the improvements hereinafter described.

The requirements of a playing ball vary, of course, according to the nature of the game for which the ball is to be used, it being well understood, for instance, that a golf-ball should be both hard and resilient, so as to withstand the force of impact of the driving stick or other implement employed therefor; and that the ball should also possess the capacity to travel long distances under heavy blows as well as comparatively short distances under light blows. To best meet these requirements in a golf-ball it has been suggested hitherto, in some instances, to so construct the ball as that a state of tension is imparted to the shell or outer structure thereof (the interior of the ball being variously constituted), and this construction has proven effective, besides serving to preserve the sphericity of the ball against forces tending to destroy the same. In making such a ball, however, the employment of skilled labor is frequently necessary, since great care must be exercised in order to derive an equal tension throughout all points of the shell or outer structure of the ball, and consequently the expense of manufacture is very great. It may be stated also that in a playing ball of this particular type the tension of the shell or outer structure thereof should be regulated in an exact degree proportionate to the depth or thickness of said shell or outer structure relatively to the diameter of the body or internal structure of the ball; but hitherto it has been practically impossible to thus construct the ball, owing chiefly to the lack of adequate means whereby the outward pressure of the internal structure thereof may be properly varied.

One of the principal objects of the present invention is to provide a playing ball having a shell or outer structure normally under a state of tension; and to provide an improved process of making the ball.

A further object is to provide means whereby, in the process of making the ball, the tension of the shell or outer structure thereof may be uniformly regulated; and to increase the efficiency of the ball, as well as to cheapen the cost of manufacture thereof.

A still further object of the invention is to provide means whereby, in the process of making the ball, the pressure of the internal structure thereof may also be regulated or varied to any desired degree.

The above and additional objects are attained by

means substantially such as are illustrated in the accompanying drawings in which;

Figure 1 is a part longitudinal sectional elevation of an apparatus or means for making playing balls in accordance with my invention; and Fig. 2 is a part vertical transverse sectional elevation thereof. Fig. 3, is a detail view of the means employed for causing the rotatable driving members of the machine to be thrown into and out of engagement with each other; and Fig. 4, is a perspective view of one of the hemispherical sections preferably employed in the manufacture of the shell or outer structure of the ball. Fig. 5, is a detail view representing more clearly the construction and operation of the machine shown in Fig. 3.

Before proceeding with a more detailed description it may be stated that the shell or outer structure of my improved playing ball may be of any suitable material, as rubber of a relatively firm quality, nitro-cellulose compounds, or gutta-percha, or analogous preparations or substances; but for golf-balls I prefer to use a shell or outer structure comprising gutta-percha segments which are previously formed into shape by pressure in suitable dies or molds, the edges of said segments being subsequently welded together in the formation of a shell or outer structure which is compact and firm and of substantially equal quality throughout the full area or extent thereof. I may form said shell or outer structure of any depth or thickness desired, and in some instances I prefer to form the same of two or more laminated segments or layers, in which case the adjoining surfaces of the laminae or layers are preferably first prepared for effective joinder thereof by applying thereto a suitable cement or solvent by which to render them practically integral with each other. For the purpose of filling the shell or outer structure after completion thereof, I form therein a relatively small perforation through which is forced any suitable material or stock to constitute the body or internal structure of the ball, such material or stock possessing, under compression, a mobility approaching the state of fluidity. By the continued forcing in of this material or stock the internal structure of the ball may be caused to impart to the shell or outer structure thereof any desired tension to support the same against the force of the blows to which the ball may be subjected; and the said filling or internal structure of the ball may be constituted of rubber or other elastic material cut up or severed into blocks or cubes, or of a continuous cord or thread covered with rubber and forced into the shell or outer structure in any suitable manner.

I employ a simple and effective machine for making the ball and preferably one which is thrown out of action automatically on completion of the operation of forcing into the external structure of the ball the mate-

rial or stock employed for the internal structure thereof; it being understood, however, that my improved process is entirely independent of the means by which the same may be carried into effect.

5 Specific reference being had to the accompanying drawings by the designating characters marked thereon, A represents a suitable base upon which is rigidly-mounted at one end a pedestal *a*, formed at a suitable height with a forward projection or shelf *b*, the inner  
10 side *c*, of said pedestal being preferably flat and vertical, as shown, while the upper surface of said projection or shelf is also flat but substantially horizontal, also as shown. The underside *b*<sup>2</sup> of the projection or shelf is also flat and horizontal for a part of its width, and inter-  
15 sects with the upper end of the inner side *c*, of the pedestal *a*, in a curve *d*, (see Fig. 1), all for the purpose hereinafter more fully explained. The said pedestal is formed with or surmounted by an extension or pillar  
20 *e*, preferably of reduced horizontal dimensions, and upon the upper end of which is held or supported a sleeve or bearing *f*, in which is held a sleeve *e*<sup>2</sup> through which passes a rotatable shaft *g*, having loosely mounted thereon a driving pulley B, the hub *h*, of which is preferably constructed with a disk B', having a flat vertical  
25 face *i*, formed or provided at a suitable point contiguous to the edge thereof with a pin or projection *k*. The inner end of the said shaft *g*, is provided with a crank or eccentric comprising preferably a disk or ring C, having a pin *l*, working in a recess therefor in the inner face of a  
30 vertically reciprocable head or slide D, which is supported in suitable guides 2, 2, therefor mounted upon the upper surface of the pedestal *a*, (see Fig. 3); and movably suspended at *m*, from the inner face of said eccentric-disk or ring is preferably a substantially circular  
35 yoke or frame C', which loosely encircles the inner portion of shaft *g*, and is provided with a lug or member *n*, designed to engage with the pin or projection *k*, on the inner face of the disk B', of pulley B, in the manner and for the purpose hereinafter explained, said lug or mem-  
40 ber *n* being normally held to such engagement by means of a spring or other pressure-device 3, and the normal position of said yoke or frame being at an outward inclination relatively to the said inner face of the eccentric-disk or ring C. The disk B', and the said  
45 movable yoke or frame C' thus constitute a clutch by which the pulley B, and the eccentric-disk or ring are caused to revolve with each other, as is apparent, and special means are to be hereinafter explained, whereby at certain stages of the manufacture of a playing ball or  
50 similar spherical body in accordance with my invention, the said parts are automatically disengaged to stop the machine. The said vertically reciprocable head or slide D, is formed with an outwardly projecting arm or projection 4, having therethrough a vertical bore or  
55 opening 5, in which is fixedly held by a set-screw or other means 6, the upper member 7, of a plunger 8, which is preferably constructed with an enlarged body-portion 9, and an integral stem 10, of comparatively slender proportions, the said body-portion containing a  
60 cushion or spring 11, and having an independent slidable movement upon the relatively fixed member 7, the lower end of the latter fitting within the upper end of the body-portion and forming a seat for the upper end or part of the said cushion or spring. The said body-portion is preferably square or rectangular in cross-section,

as shown, and is fitted in a corresponding opening therefor formed in a lower ledge or shelf 12, projecting from the side of the vertically reciprocable slide D, hereinbefore referred to; and in order that the independently movable part of the plunger may be prevented from  
70 slipping through said opening, some suitable means are provided engaging the upper surface of the said ledge or shelf 12. Formed with or attached to the outer side of said hollow body-portion of the plunger, and movable therewith, is a plate 14, which slides up and down in a  
75 guide therefor in the ledge or shelf 12; and working in a vertical opening formed in the slide D, is a pin 15, a spring 16, being also situated in said opening, and having its bearings between the upper end of said pin and the lower end of a screw 17, adjustable in the walls of the  
80 opening for the purpose of regulating the tension of said spring. Located in suitable bearings therefor in the slide D, and transversely of the latter, is a rotatable rod or shaft 18 of suitable length, and having thereon oppositely disposed radial wings or blades 19, and 20, the  
85 former one of which supports the lower end of the pin 15, while its own end rests upon the upper end of the said slidable plate 14 (see Fig. 1), the other one of said wings or blades being normally disengaged and free, and the two said elements operating in the manner here-  
90 inafter more fully explained.

The outer end of the shaft *g*, is constructed with an irregular cam-surface 21, against which bears a friction roll or disk 22, carried at the upper end of the shorter arm 23, of a lever E, pivoted at 24, to a bracket 25, on  
95 the outer side of the pillar *e*, the longer arm 26, of said lever being movably connected at 27, to the outer end of a longitudinally reciprocable rod 28, the inner and upwardly curved extremity of which is in similar connection at 29, with the upper end of an arm 29<sup>a</sup> loosely  
100 supported upon the shaft 30, of the uppermost one of a pair of vertically disposed feed-rolls 31, and 32, mounted in suitable bearings therefor in the upper part of the pedestal *a*, said shaft of the said uppermost roll being provided adjacent to said arm with a ratchet-  
105 wheel 33, the teeth of which are intermittently engaged by means of a pawl 34, pivoted to the side of the arm; the said reciprocable rod 28, having connected to a lug 28<sup>a</sup> thereon, one end of a spring 28<sup>b</sup>, having its other end connected at 28<sup>c</sup> to the pedestal. The said  
110 rolls 31, and 32, serve to intermittently feed a strip 35, of elastic stock or filling material 36, for the ball through a guide 37, therefor located in a recess 38 in the projection *b*, of the pedestal, said guide being held in place by means of a set-screw 39, working in the threaded  
115 wall of an opening 40, also formed in said projection substantially at right angles to the said recess 38. As herein shown, the said guide 37, rests upon the innermost one of a pair of dies 41, and 42, said innermost die being constructed to fit snugly within the recess formed  
120 between the upper surface of the base A, and the adjacent straight sides *c*, and *b*<sup>2</sup>, of the pedestal and projection *b*, thereof, respectively, and the vertical meeting faces 43 of the two dies being each formed with a semi-circular recess 44, which between them constitute a  
125 hollow spherical cavity in which the hemispherical shell segments or outer structure of the ball 45, are contained during the process of filling or forcing into said outer structure the material or stock for constituting the inner structure of the ball. The said meeting  
130

faces 43, of the dies are held in close contact by any suitable means, preferably consisting herein of a yoke 46, pivoted at 47, on opposite sides of the outermost die 42, and having at about the central point of each arm or member 48 thereof, a comparatively deep notch which is open at the lower edge of the said arm or member to permit the slightly curved sides of the notch to be moved down upon a pin 49, projecting from the pedestal at either side thereof, the said dies being in this way firmly locked together; and the said arms or members 48, being provided at their free ends with outstanding handles 50, by which to effect both the raising and lowering of the yoke when desired. It will thus be seen that the dies 41, and 42, are removable, and it should be stated that preferably, in the present instance, the innermost die is recessed at 51, a suitable distance from the base A, to receive the curved portion of a pipe 52, which extends forwardly on opposite sides of both dies (see Fig. 2) for the passage of steam or other heating agent, whereby said dies may be heated, if desired, during certain steps of my improved process.

At substantially a central point of the said meeting faces of the two dies an opening 53 is formed in the latter directly in line with and approximately of the same size as the slender portion or stem 10, of the plunger 8, the said opening being in direct line vertically with the guide 37, for the filling material of the ball, see Fig. 1; and the end of said slender portion or stem of the plunger being beveled to form a cutting edge 10<sup>a</sup> thereon, so that portions of such material may be severed from the strip thereof on each descent of the said plunger.

In the present instance, the outer structure 45, of the ball to be constructed is made up of two hemispherical segments of suitable material previously united or welded together at the edges, either by the same dies 41 and 42, or other dies for the purpose, and the hollow shell or sphere thus constituted is formed therethrough with a perforation of relatively small size coinciding with the opening 53 in the dies, and in said perforation a short tube 56, is inserted for the proper guidance through and into the shell of the said plunger-stem. The shell or outer structure of the ball may be composed of a single layer only of the desired material, but in some cases I prefer to make the same in two or more spherical laminae or layers, as hereinbefore specified, and as indicated by the solid and dotted lines in Fig. 1; the lines *x*, and *y*, representing the points of joinder or welding of the meeting edges of the segments of which the said shell or outer structure is composed in the first instance.

It is apparent that by connecting the pulley B, with a belt from any suitable source of driving power the head or slide D, will be reciprocated vertically, and at the same time the rod 28, will be reciprocated longitudinally of the machine by reason of engagement of the cam-surface 21, with the roll at the upper end of the shorter arm of lever E, the feed-rolls for the strip of stock of filling material for the ball being thus operated intermittently to feed such strip through the guide therefor so as to carry the inner end of the strip into position across the upper end of the short tube 56. A downward movement of the plunger takes place succeeding each inward feed of said strip, and during such movement a portion of the strip is severed or cut off and forced through the tube 56, into the shell or outer

structure of the ball, this operation being permitted to continue until the internal structure of the ball is completed. As the said shell is thus gradually filled by the cubes or severed portions of the stock these cubes or severed portions are acted upon by the end of the slender portion or stem 10, of the plunger in such manner as to become packed within the interior of the shell, and in this way any desired outward pressure of the internal structure of the ball may be obtained. The strip of stock or filling material thus employed is preferably formed of rubber or other elastic material, but, as before stated, my invention comprehends the use of a continuous elastic cord which may be packed into the shell or outer structure of the ball in like manner without cutting or severing the same, in which case the stem of the plunger may be blunt or unsharpened at the end, if desired.

I preferably employ suitable means for effecting stoppage of the machine automatically on completion of the filling in of the stock or material constituting the internal structure of the ball, and hence one of the reasons for constructing the plunger in the manner herein shown and described, since in this way the independently movable part of said plunger is permitted to gradually rise upon the relatively stationary part thereof, accordingly as the stock or material packed into the shell or outer structure of the ball reaches a greater height, the cushion or spring interposed between said movable and stationary parts of the plunger serving to give to the latter a yieldable action, as is apparent.

Mounted on a suitable fulcrum 60 (see Fig. 3), therefor is a hand-lever 61, having a curved arm 62, formed with a wedge or tapered edge 63, and also having an arm 64, to which is connected one end of a spring 64<sup>a</sup>, having a seat 65 for the lower end thereof, the said spring tending to carry the said wedge or tapered edge of the arm 62, into engagement with the yoke or movable frame C', in such manner as to force the latter against the side of the ring or disk C, and thereby disconnect said ring or disk from the pulley B. In order, however, to enable a clutch engagement to be effected between said pulley and said yoke or frame, whereby the slide D, may be reciprocated, in the manner and for the purpose herein set forth, I provide a suitable shaft 68, located parallel to the hand-lever 61, in bearings 69 therefor, said shaft being formed or provided at its inner end with an arm 70, having a member 71, for engaging an edge of a notch 72, formed in the lower curved edge of said lever-arm 62; and said shaft also being provided with a spring 75, tending to turn the shaft in the direction of the adjacent side of said lever. By elevating the end of the arm 64, of the lever the curved arm thereof is depressed, whereupon the yoke or frame C', is forced into engagement with pulley B, the lever being held or maintained in the position to which it is thus brought, by means of the member 71, which is carried into the notch 72, on the described action of said spring 75. On withdrawal of the member 71, from said notch the spring 64, exerts a downward pull on the lever-arm 64, and the wedge or curved edge of the arm 62 of said lever is carried in engagement with the said yoke or frame C', whereupon the machine ceases operation. To effect disengagement of the member 71, from the edge of the notch 72, automatically, I

may provide any suitable means, preferably shown in the present instance as an arm or member 75<sup>a</sup>, projecting laterally from the shaft 68, and extending inward beneath the wing or blade 20, on the rod or shaft 18, so that at the proper stage of the process of making a ball, the said shaft 68 will be rocked in its bearing to withdraw the member 71, from the notch 72, and thus effect disengagement of the yoke or frame from the pulley.

During the operation of filling the shell by the means and in the manner already described, the gradual rise of the movable part of the plunger upon the relatively stationary part thereof, causes the plate 14, to exert a gradually increasing pressure upon the underside of blade or wing 19, of rod or shaft 18, with each upward movement of the plunger, and the action of the machine is such that at about the time the filling in of the external structure of the ball is completed, the blade 20, engages the said arm or member and thus causes release of the yoke or frame from its connection with the said pulley, whereupon by releasing the fastening yoke for the dies the ball structure may be removed and the perforation in the shell thereof properly plugged up in any suitable manner. With the gradual rise of the independently movable part of the plunger the said rod or shaft 18, is of course gradually turned in its bearing, and the consequent upward movement of the said blade or wing 19, is against the pressure of the spring-pressed pin resting thereon, the said pin coöperating with the vertically movable plate on the plunger to maintain the working organization of the elements described.

It may be stated that the machine herein described is simple and effective for its purpose, and yet immaterial changes therein may be made and still come within the scope of my invention.

Having thus described my invention, I claim—

1. A process of making playing balls and other similar bodies, consisting in forming a hollow spherical shell, and placing the same under tension, by forcing into the shell sections of elastic material.
2. A process of making playing balls and other similar bodies, consisting in forming a hollow spherical shell, and placing the same under permanent outward tension, by forcing into the shell sections of elastic material.
3. A process of making playing balls and other similar bodies, consisting in forming a hollow spherical shell, and placing the same under tension from within, by forcing into the shell sections of elastic material.
4. A process of making playing balls and other similar bodies, consisting in forming a hollow spherical shell, and placing the same under outward tension from within, by forcing into the shell sections of elastic material.
5. A process of making playing balls and other similar bodies, consisting in forming a hollow spherical shell, and placing the same under permanent outward tension at all points thereof from within, by forcing into the shell sections of elastic material.
6. A process of making playing balls and other similar bodies, consisting in forming a hollow spherical shell, and placing the same under uniform regulated tension, by forcing into the shell sections of elastic material.
7. A process of making playing balls and other similar bodies, consisting in forming a hollow spherical shell, and placing the same under uniform regulated outward tension from within, by forcing into the shell sections of elastic material.
8. A process of making playing balls and other similar bodies, consisting in forming a hollow spherical shell, and placing the same under uniform permanently regulated tension at all points thereof from within, by forcing into the shell sections of elastic material.
9. A process of making playing balls and other similar bodies, consisting in forming segments of a sphere, then

uniting the segments, and finally placing the shell thus formed under tension, by forcing into the shell sections of elastic material.

10. A process of making playing balls and other similar bodies, consisting in forming segments of a sphere, then uniting the segments, and finally placing the shell thus formed under permanent outward tension, by forcing into the shell sections of elastic material.

11. A process of making playing balls and other similar bodies, consisting in forming segments of a sphere, then uniting the segments, and finally placing the shell thus formed under tension from within, by forcing into the shell sections of elastic material.

12. A process of making playing balls and other similar bodies, consisting in forming segments of a sphere, then uniting the segments, and finally placing the shell thus formed under outward tension from within, by forcing into the shell sections of elastic material.

13. A process of making playing balls and other similar bodies, consisting in forming segments of a sphere, then uniting the segments, and finally placing the shell thus formed under permanent outward tension at all points thereof from within, by forcing into the shell sections of elastic material.

14. A process of making playing balls and other similar bodies, consisting in forming segments of a sphere, then uniting the segments, and finally placing the shell thus formed under uniform regulated tension, by forcing into the shell sections of elastic material.

15. A process of making playing balls and other similar bodies, consisting in forming segments of a sphere, then uniting the segments, and finally placing the shell thus formed under uniform regulated outward tension from within, by forcing into the shell sections of elastic material.

16. A process of making playing balls and other similar bodies, consisting in forming segments of a sphere, then uniting the segments, and finally placing the shell thus formed under uniform permanently regulated tension at all points thereof from within, by forcing into the shell sections of elastic material.

17. A process of making playing balls and other similar bodies, consisting in forming a hollow spherical shell, and forcing therein a material to constitute the internal structure of the ball, by forcing into the shell sections of elastic material.

18. A process of making playing balls and other similar bodies, consisting in forming a hollow spherical shell, and forcing therein an elastic material under compression, by forcing into the shell sections of elastic material.

19. A process of making playing balls and other similar bodies, consisting in forming a hollow spherical shell, and forcing therein a material tending to expand in all directions, by forcing into the shell sections of elastic material.

20. A process of making playing balls and other similar bodies, consisting in forming a hollow spherical shell, and gradually forcing therein sections of elastic material and imparting thereto a tendency to expand in all directions.

21. A process of making playing balls and other similar bodies, consisting in forming a hollow spherical shell and perforating the same, then forcing into the shell through the perforation sections of elastic material under compression, and finally closing the perforation.

22. A process of making playing balls and other similar bodies, consisting in forming segments of a sphere, then uniting the segments, and finally forcing into the shell thus formed sections of material to constitute the internal structure of the ball.

23. A process of making playing balls and other similar bodies, consisting in forming segments of a sphere, then uniting the segments, and finally forcing into the shell thus formed sections of elastic material under compression.

24. A process of making playing balls and other similar bodies, consisting in forming segments of a sphere, then uniting the segments, and finally forcing into the shell thus formed sections of material tending to expand in all directions.

25. A process of making playing balls and other similar bodies, consisting in forming segments of a sphere, then

uniting the segments, and finally forcing into the shell thus formed sections of elastic material and imparting thereto a tendency to expand in all directions.

26. A process of making playing balls and other similar bodies, consisting in forming segments of a sphere and perforating the same, then uniting the segments, then forcing into the shell through the perforation sections of elastic material, and finally closing the perforation.

27. A process of making playing balls and other similar bodies, consisting in forming a hollow spherical shell, providing the same with perforations, and forcing blocks of elastic material into and compressing the same in said shell.

28. A process of making playing balls and other similar bodies, consisting in forming segments of a sphere providing one of the segments with a perforation, then uniting the segments, and finally forcing into the perforation blocks of elastic material and imparting to the latter the tendency to expand in all directions. 15

Signed at Nos. 9-15 Murray St., New York, N. Y., this 20 23rd day of October, 1902.

FRANCIS H. RICHARDS.

Witnesses:

E. EVERETT ELLIS,  
JOHN O. SEIFERT.