No. 820,140. PATENTED MAY 8, 1906.

A. T. SAUNDERS.

BALL ROLLING MACHINE.

APPLICATION FILED DEC. 4, 1905.

3 SHEETS—SHEET 1.

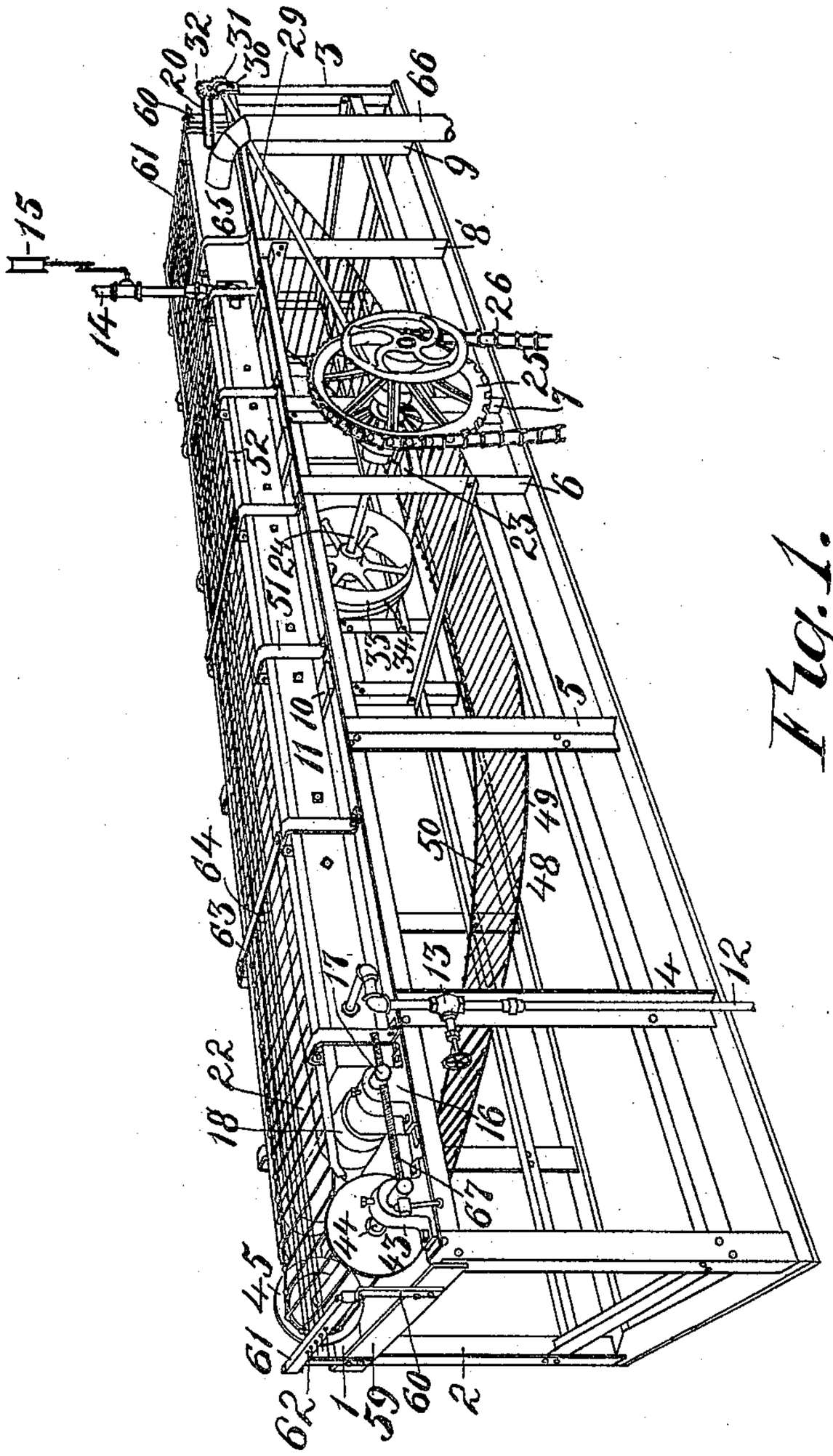


Fig. 1.

Witnesses,
Edna Bortz
Glenara Fox

Inventor;
A. T. Saunders,
by C. E. Humphrey,
Atty.

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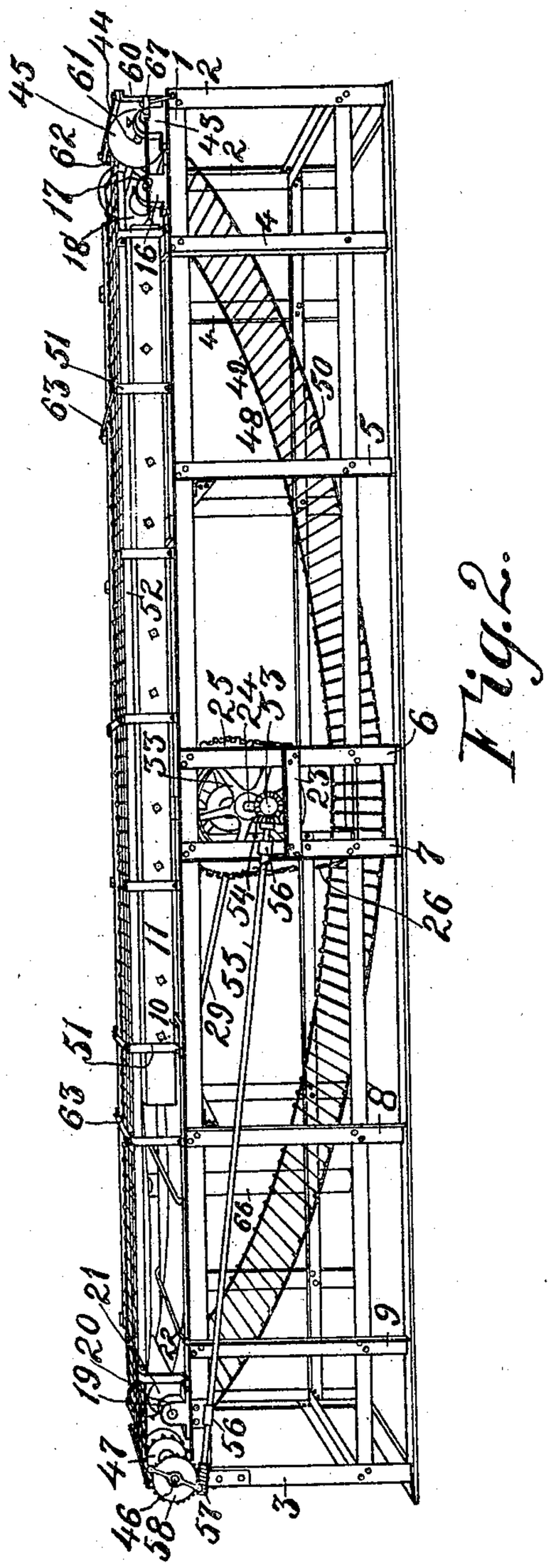


Fig. 2.

Witnesses:
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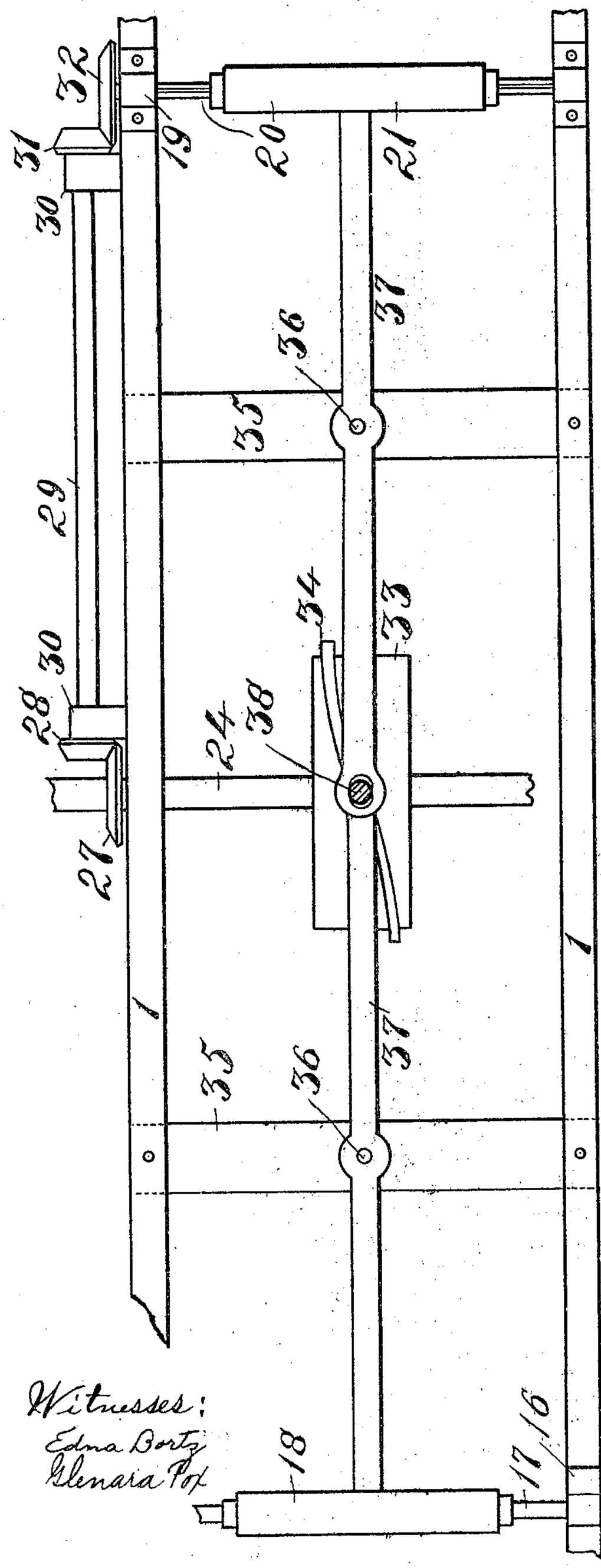


Fig. 3.

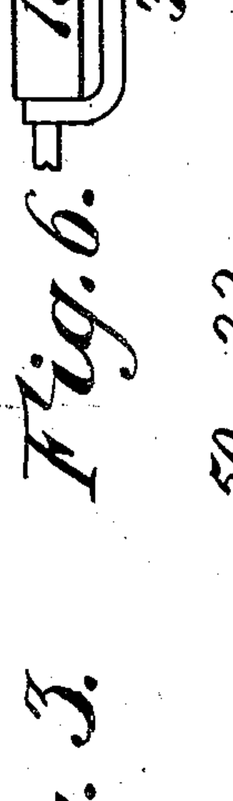


Fig. 6.

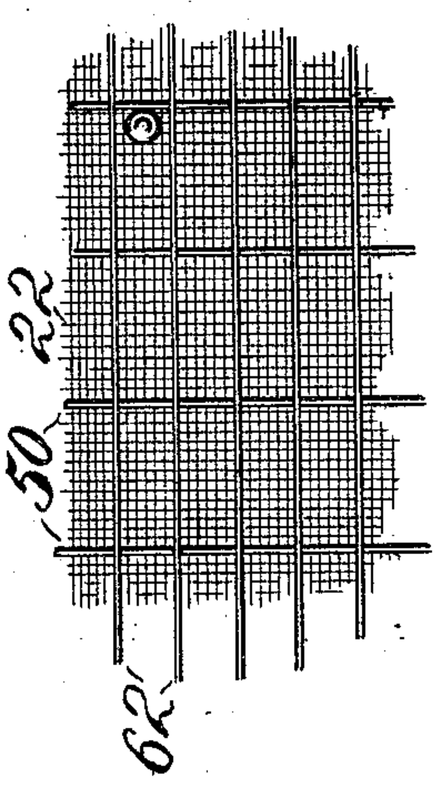


Fig. 5.

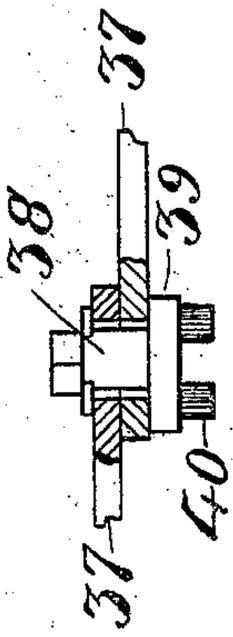


Fig. 4.

Witnesses:
Edna Bortz
Glenara Fox

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A. T. Saunders,
by C. E. Humphrey,
Atty.

# UNITED STATES PATENT OFFICE.

ADDISON T. SAUNDERS, OF AKRON, OHIO, ASSIGNOR OF ONE-HALF TO FRANK A. SEIBERLING, OF AKRON, OHIO.

## BALL-ROLLING MACHINE.

No. 820,140. Specification of Letters Patent. Patented May 8, 1906.

Application filed December 4, 1905. Serial No. 290,159.

*To all whom it may concern:*

Be it known that I, ADDISON T. SAUNDERS, a citizen of the United States, residing at Akron, in the county of Summit and State of Ohio, have invented new and useful Improvements in Ball-Rolling Machines, of which the following is a specification.

This invention has relation to devices for performing one step in the manufacture of certain articles; and it consists in mechanism for continuously rolling the articles, so that their axes of rotation are constantly changing.

This invention, while suitable for other purposes, is primarily designed to roll a hollow sphere constituting either a playing-ball or a nucleus therefor, so that a fluent or semifluent air-proof material placed therein will be formed into a uniform lining therefor and be distributed evenly and effectually within the shell of the sphere.

It has been found that a hollow sphere, especially when constructed wholly or in part from rubber, and whether used alone as a playing-ball or as a nucleus for golf or similar balls, is not perfectly air-proof under a charge of fluid placed therein. Hence it has been found necessary to place within said sphere some form of lining which will render the same fluid-tight. In providing linings of this character for spheres which are to be used either as playing-balls or as a nucleus for the superimposition thereon of other coverings to adapt them for other uses it is preferable to place the lining within the ball in a fluent or semifluent condition and subsequently roll or rotate the sphere continuously until the fluent lining sets and becomes either solid or semisolid. There are two classes of linings which may preferably be used, one class being designated to set when the article in which it is placed is cooled and the other when the temperature of the article is raised sufficiently to coagulate the fluent lining.

The object of this invention, therefore, is to provide a simple and suitable device for receiving the hollow spheres containing the fluent lining which will constantly roll them about on constantly-changing axes until the fluent material contained therein has been sufficiently distributed to constitute an even lining and has set enough to be approximately self-maintaining.

The invention further aims to supplement the mechanism for imparting a rotary motion with suitable means for maintaining or changing the temperature of the spheres during the rolling thereof.

With the foregoing and other objects in view the invention consists of the novel construction, combination, and arrangement of parts constituting the invention, to be hereinafter referred to, and illustrated in the accompanying drawings, which form a part of this specification, in which is shown the preferred embodiment of the invention; but it is to be understood that changes, variations, and modifications can be resorted to which come within the scope of the claims hereunto appended.

In the drawings, in which similar reference-numerals indicate like parts in the different figures, Figure 1 is a perspective view of one side of the device. Fig. 2 is a view similar to Fig. 1 looking from the opposite side of the machine. Fig. 3 is a detail of certain mechanism under the main upper portion of the device and hidden in Figs. 1 and 2. Fig. 4 is a detail of a pin used in this device. Fig. 5 is an enlarged view of various belts used in connection with this device, and Fig. 6 an enlarged view of one of the rollers.

It will be stated that while the mechanism described herein is equally applicable for the rolling of various articles the description herein for the purpose of this application will be confined wholly to rubber spheres adapted for use as playing-balls or as nuclei for playing-balls.

In the drawings, 1 1 represent two longitudinal horizontal parallel bars supported at one end by a pair of legs 2 and at the opposite end by a pair of legs 3. These bars are further supported by pairs of legs, (designated by the reference-numerals 4, 5, 6, 7, 8, and 9,) the members of each pair being oppositely disposed in position with respect to each other.

Mounted on a plurality of cross-bars 10, extending between the bars 1, is a chamber 11, to which fluids may be conducted by means of a pipe 12, provided with a cock 13. This chamber 11 is provided with an outlet 14, to which is preferably attached a gage 15, by which the pressure of fluid within the chamber is determined.

Mounted in longitudinally-slidable jour-

nals 16, extending between the bars 1 1 at one end of the machine, is a non-revoluble shaft 17, on which is mounted an idler-roll 18. Mounted at the opposite end of the device on the bars 1 1 are journals 19, in which is rotatably mounted a shaft 20, to which shaft is splined a roller 21. Between the rollers 18 and 21 extends a wide-faced belt 22, preferably made of wire-gauze. These rollers are so disposed with respect to the balance of the mechanism that the belt 22 when extended between the upper peripheries of the two rollers 18 and 21 will lie along and travel on the upper face of the chamber 11 and the lower portion of the belt depending between the two rollers will hang below the said chambers and out of contact therewith. This belt 22 is arranged to have two motions, one of which is longitudinal in the ordinary manner of a belt used for conveying power from one pulley to another. This motion is imparted to the belt 22 by means of the following mechanism: Extending between the legs 6 and 7 on each side of the device are cross-bars 23, on which are mounted journals in which are rotatably mounted a transverse main driving-shaft 24. This shaft bears at one end a large sprocket-wheel 25, which receives power from a sprocket-chain 26, driven by any ordinary source of power. Reference is now directed to Fig. 3. On the same end of the shaft 24 on which is mounted the sprocket-wheel 25 is a beveled gear 27, into which meshes a beveled gear 28, mounted upon a shaft 29, sustained rotatably in bearings 30. The opposite end of this shaft 29 also bears a beveled gear 31, which is adapted to mesh into a beveled gear 32 on the end of the shaft 20, on which is mounted the roller 21. It will be thus seen that as the main driving-shaft 24 is rotated in its journals a continuous progressive movement of the belt 22 is secured, and as this belt lies along the top of the chamber 11 it will move longitudinally thereof. This belt has an entirely distinct motion to its longitudinal progressive motion. This second motion of the belt is reciprocal and transverse to its longitudinal motion, causing the belt to move sidewise, as well as lengthwise, from which it follows that any given point on the belt would produce a line formed upon undulating curves or having a serpentine shape consisting of alternate convex and concave lines. This reciprocal action of the belt is attained by the following mechanism: Mounted on the shaft 24 is a wheel 33, having on its exterior periphery a cam-ridge 34. The amount of the deflection of the cam-ridge 34 from a true line will be accurately ascertained, so that a corresponding reciprocation of the belt 22 through mechanism to be hereinafter described will result. Extending between the bars 1 1 of the frame are cross-bars 35, which bear approximately centrally upright pins 36, on which are mounted two arms 37, adapted to swing horizontally thereon. The inner ends of these arm 37 are formed with elongated openings and are adapted to inclose a pin 38, to the lower end of which is secured a head 39, having depending therefrom two friction-reducing rollers 40. These rollers 40 are so positioned as to coöperate with the ridge 34 and follow its movements, and as the pin 38 passes through the openings in the ends of the arm 37 the movements of the head 39 and pin 38 will be transmitted to the arms 37. The outer ends of these two arms 37 are slotted and are adapted to receive pins 41, depending from yokes 42, the outer ends of which inclose the shafts 17 and 20 on both sides of the rollers 18 and 21, so that when the yokes 42 are reciprocated under the influence of the arms 37 the rollers 18 and 21 will be slid along their respective shafts; but their revolution thereon will not be interrupted.

It will be seen from the following description that the shaft 24 simultaneously imparts two distinct movements to the belt 22. Mounted in bearings 43 on the bars 1 1 at one end of the machine is a shaft 44, which bears a pair of oppositely-disposed flanged sprocket-wheels 45, and at the opposite end of the machine and similarly mounted is a shaft 46, bearing flanged sprocket-wheels 47, corresponding in position and shape to the sprocket-wheels 45. On these sprocket-wheels 45 and 47 is adapted to run a belt 48, consisting of side chains 49 and cross-bars 50, extending between the side chains 49 and spaced apart from each other. This chain 49 is adapted to travel over and be spaced apart from the belt 22 in its passage, and the following mechanism is employed to sustain it during its transit from one sprocket-wheel to another. Mounted on the side bars 1 1 are a series of brackets 51, adapted to support a pair of longitudinal parallel guides 52, in which the chain portions 49 of the belt 48 will run and be supported. It is obvious, therefore, that this chain 49 is entirely independent of and spaced apart from the belt 22. Motion is communicated to this belt 48 in the following manner: On the opposite end of the shaft 24 from that containing the sprocket-wheel 25 is a beveled gear 53, into which meshes a beveled gear 54, mounted on the end of a shaft 55, sustained in suitable bearings 56, bearing at its outer end a worm 57. This worm 57 is adapted to engage a worm-wheel 58, mounted on the end of the shaft 46, so that as the shaft 24 is revolved the chain 49 will be continuously and slowly moved over the chamber 11, but spaced therefrom.

Extending between the end legs 2 2 and 3 3 are cross-bars 59, and on these cross-bars 59 are posts 60, having extending between them top bars 61. Between these top bars of the device are strung a plurality of tightly-drawn wires

62, suitably spaced apart from each other and lying slightly above the cross-bars 50 of the chain 48. These wires are supported centrally against unintentional sag by one or more bars 63, which extend between the brackets 51 and which have at suitable points in their under face depending supports 64, which engage the wires 62 and sustain them individually against sagging and lateral displacement.

In constructing this device I preferably make the chamber 11 considerably shorter than the longitudinal bars 1 1 and place this chamber 11 so that at one end of the device a considerable space intervenes between it and the roller for the belt 22, and into this space, which may be partially inclosed by a plate, as shown at 65, I prefer to force a cooling fluid through a pipe 66. This portion of the device, however, is only auxiliary and is not always necessary in the operation thereof.

In order to tighten the belt 22, I pass a pair of screws 67 through the ends of the shaft 17, which is mounted upon slidable journals 16, and also through the ends of the shaft 44, which is tightly mounted in the bearings 43, and by manipulating these two screws the two rollers 18 and 21 are moved toward or away from each other sufficiently to keep the belt 22 in perfect condition for use.

It will be noted that the transverse bars 50 of the chain 49, in connection with the longitudinal wires 62, divide the space above the belt 22 into a plurality of approximately rectangular spaces, and it will be further obvious that the number of cross-bars 50 and longitudinal cross-bars 61 may be increased or diminished as the case requires, and their size will be governed by the size of the spheres which are to be rolled by this device.

The operation of this device is as follows: Motion being communicated to the shaft 24, the belt 22 is moved progressively and reciprocally across the upper surface of the chamber 11, and at the same time the belt 48 moves thereover, but at a much less speed, and it will be here stated that this belt 48 constitutes a conveying or feeding belt for the entire mechanism. The hollow spheres containing a fluent or semifluent lining are placed upon the belt 22 at the end of the device opposite to that in which the pipe 66 is located, and in placing these spheres thereon they will be so placed that each sphere will occupy one of the spaces bounded by the cross-bars 50 and longitudinal wires 62. Previous to the placing of these spheres on the belt 22 the chamber 11 will be heated to a desired degree by the introduction therein of live steam through the pipe 12 if the matter contained in the spheres is of a nature to be set by the use of heat; but if the linings are adapted to be brought to a proper condition by any other kind of temperature than heat any other suitable fluid may be introduced to the chamber 11. It will be seen that the spheres will be slowly and progressively drawn over the face of the belt 22 by means of the feed-chain 48 and that during their transit thereover the compound motion imparted to the belt 22 will cause them to be rotated upon constantly-changing axes, whereby the lining placed therein will be evenly and perfectly distributed and so kept until it has reached the consistency desired by the operator, which may be determined by timing or other suitable means. As the spheres pass over the end of the belt 22 they will fall into any proper receptacle provided for their reception. The travel of the feed or conveyer belt 48 must be so regulated that sufficient time will elapse between their placement on the belt 22 and their removal therefrom that their linings will be brought to the exact condition sought. The spheres are guided and kept from leaving the belt 22 by means of the wires 62, between which they are conveyed.

What I claim is—

1. A device of the class described comprising a temperature-controlling means, means to sustain articles within the influence of said temperature-controlling means, said sustaining means being capable of a simultaneous longitudinal and transverse reciprocal motion, whereby said articles are constantly rotated on different axes.

2. A device of the class described comprising a temperature-controlling means, means to sustain articles within the influence of said temperature-controlling means, said sustaining means being capable of a simultaneous longitudinal and transverse reciprocal motion, whereby said articles are constantly rotated on different axes, and means for loosely confining articles while so sustained.

3. A device of the class described comprising a temperature-controlling means, means to sustain articles within the influence of said temperature-controlling means, said sustaining means being capable of a simultaneous longitudinal and transverse reciprocal motion, and independent means to feed articles over said sustaining means.

4. A device of the class described comprising a temperature-controlling means, means to sustain articles within the influence of said temperature-controlling means, said sustaining means being capable of a simultaneous longitudinal and transverse reciprocal motion, means to feed articles over said sustaining means, and means for loosely confining said articles while so fed.

5. A device of the class described comprising a temperature-controlling means, means to sustain articles within the influence of said temperature-controlling means, said sustaining means being capable of a simultaneous longitudinal and transverse reciprocal mo-

tion, means to feed articles over said sustaining means, and means for loosely confining said articles in operative relation with said sustaining means while being fed thereover.

6. A device of the class described comprising a temperature-controlling means, a belt arranged to travel within the influence thereof, means to impart a simultaneous longitudinal and reciprocal motion to said belt whereby said articles are constantly rotated on different axes and means for loosely confining articles thereon.

7. A device of the class described comprising a temperature-controlling means, a belt arranged to travel within the influence thereof, and guides for loosely confining the movements of articles whereby said articles are constantly rotated on different axes while fed over said belt.

8. A device of the class described comprising a temperature-controlling means, a belt arranged to travel within the influence thereof, means to impart to said belt a simultaneous longitudinal and reciprocal motion, means to feed articles over said belt, and means for loosely confining said articles in their transit thereover.

9. A device of the class described comprising a temperature-controlling means, a belt arranged to travel within the influence thereof, means to impart to said belt a reciprocal motion, means to feed articles over said belt, and means for loosely confining said articles during their transit thereover.

10. A device of the class described comprising a conveying means, means for rotating articles sustained on said conveying means, means for loosely confining articles on said conveying means, and means to control the temperature of articles while sustained on said conveying means.

11. A device of the class described comprising a conveying means, means for imparting to said conveying means a simultaneous longitudinal and reciprocal motion, whereby articles sustained thereon are constantly rotated on different axes.

12. A device of the class described comprising a conveying means, means for imparting to said conveying means a simultaneous longitudinal and reciprocal motion, a feeding device to feed articles over said conveying means, means for loosely confining articles on said conveying means, and means to control the temperature of said articles while on said conveying means.

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

ADDISON T. SAUNDERS.

Witnesses:
GLENARA FOX,
C. E. HUMPHREY.