

No. 715,230.

Patented Dec. 2, 1902.

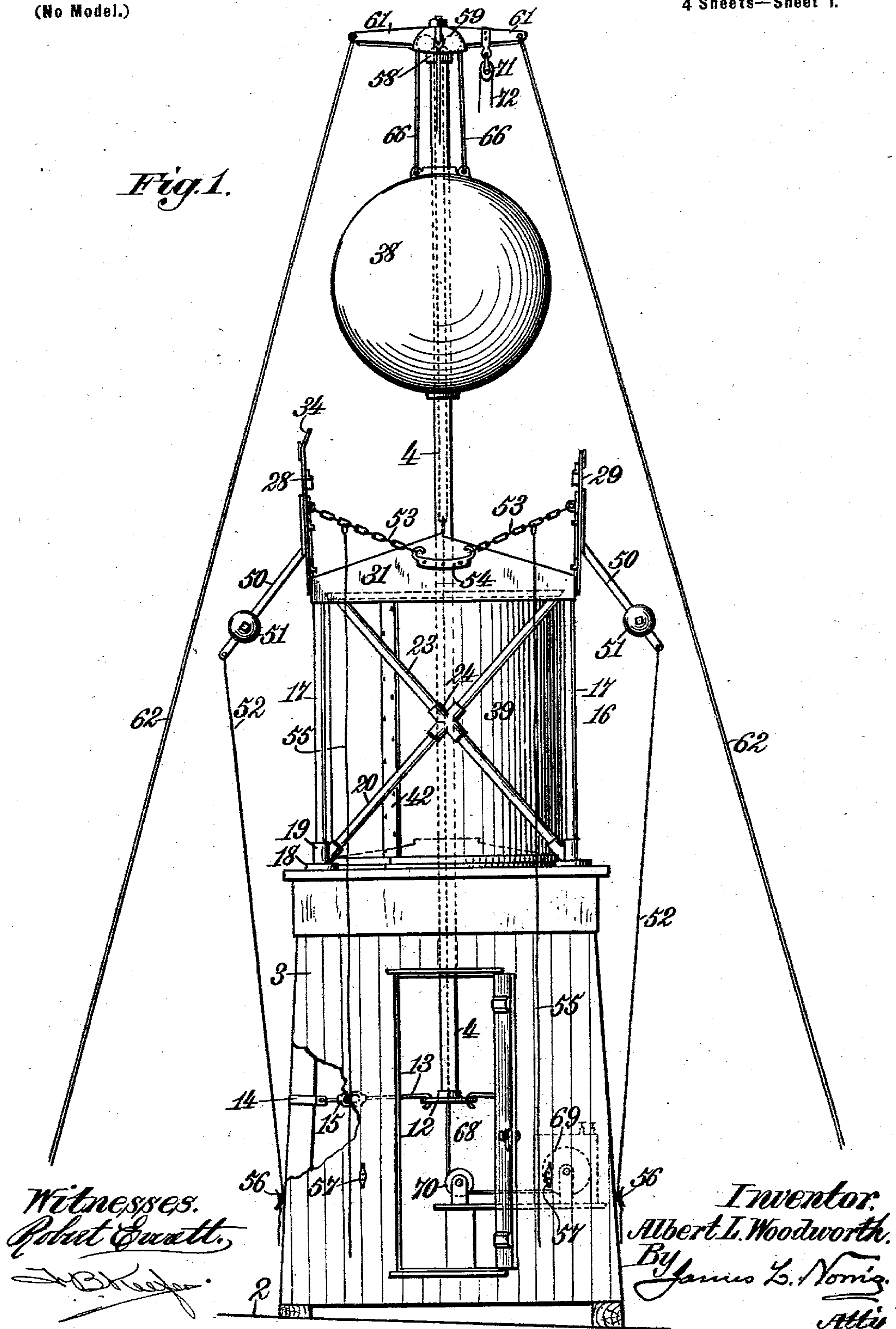
A. L. WOODWORTH.
TIME BALL APPARATUS.

(Application filed Nov. 27, 1901.)

(No Model.)

4 Sheets—Sheet 1.

Fig. 1.



No. 715,230.

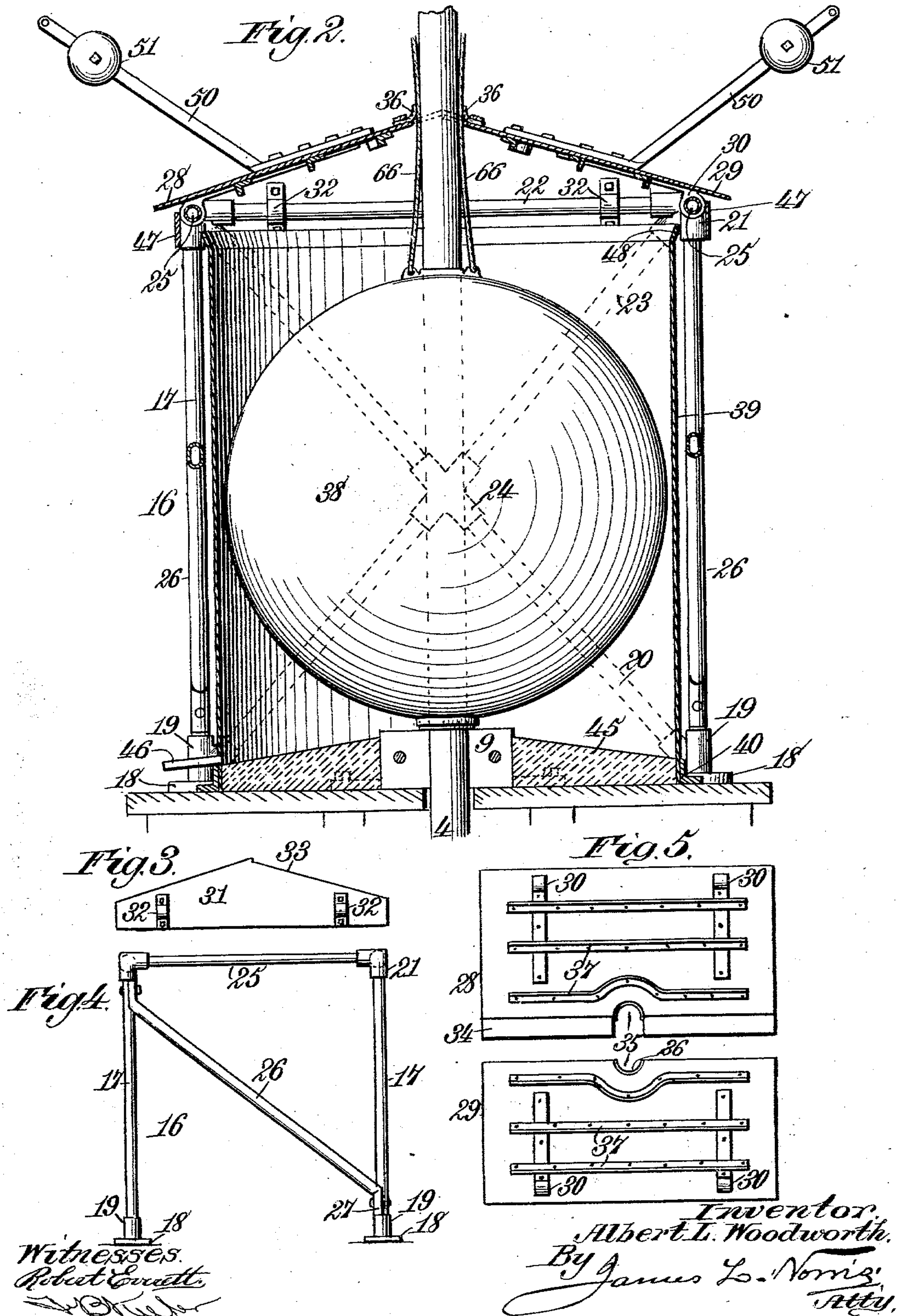
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4 Sheets—Sheet 2.



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4 Sheets—Sheet 3.

Fig. 6.

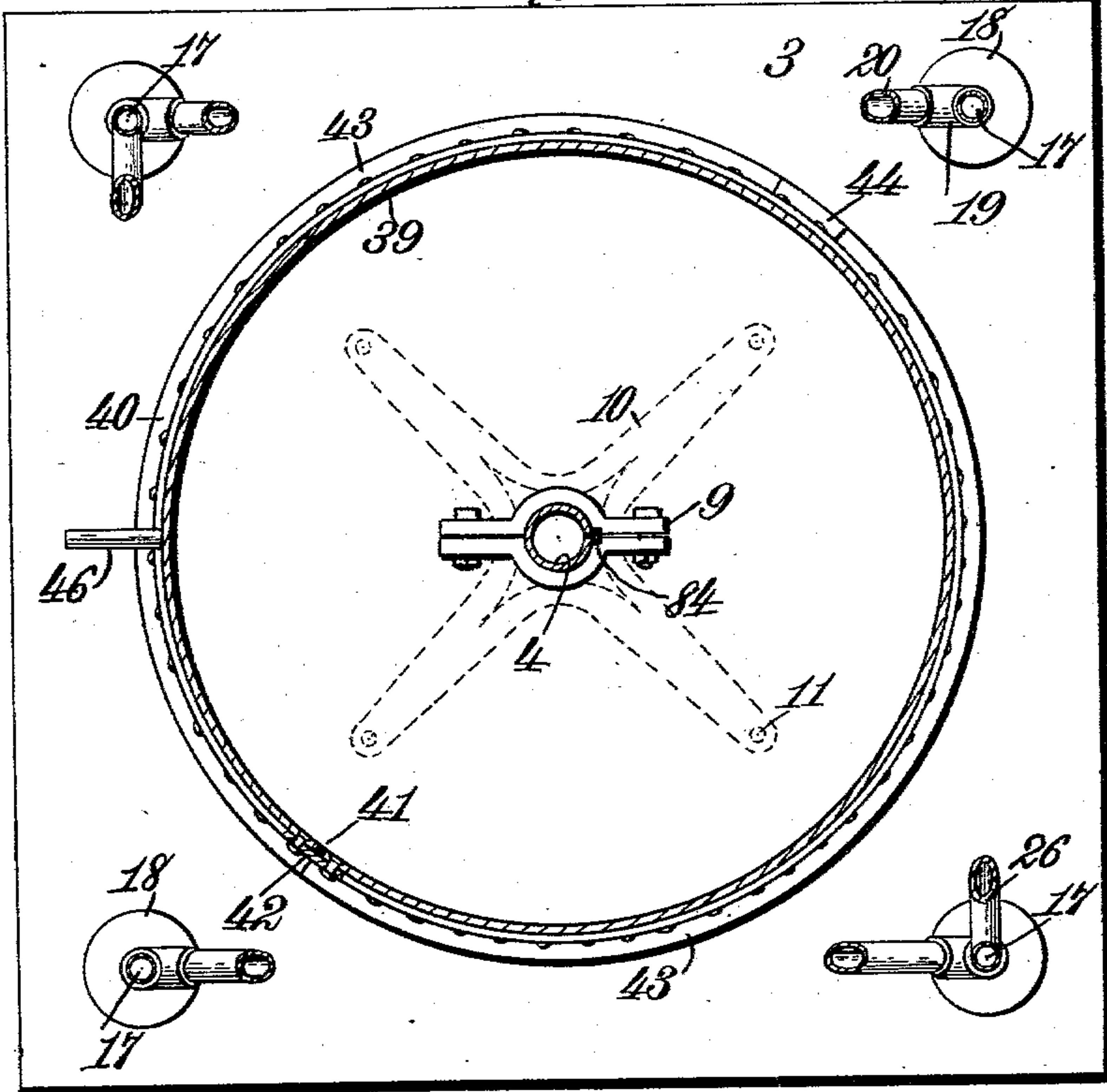


Fig. 8.

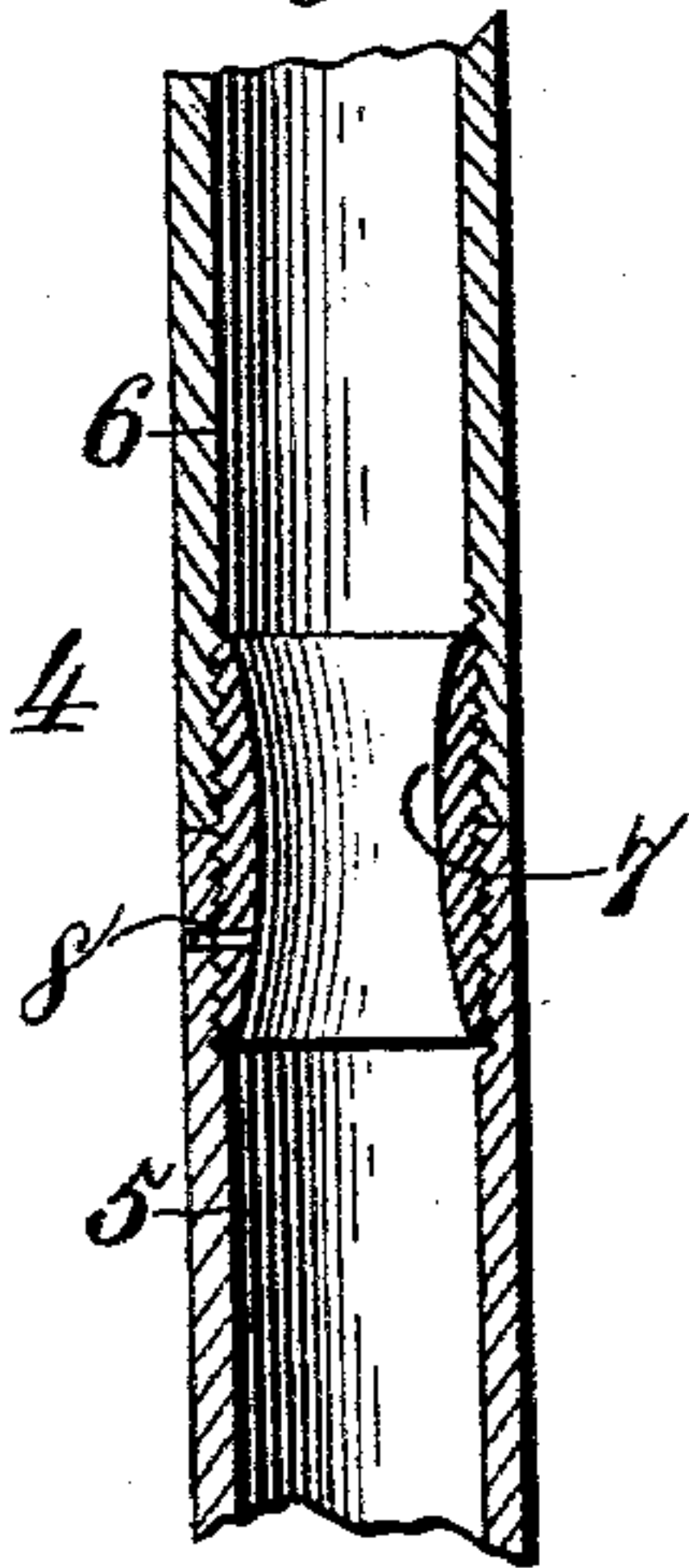


Fig. 7.

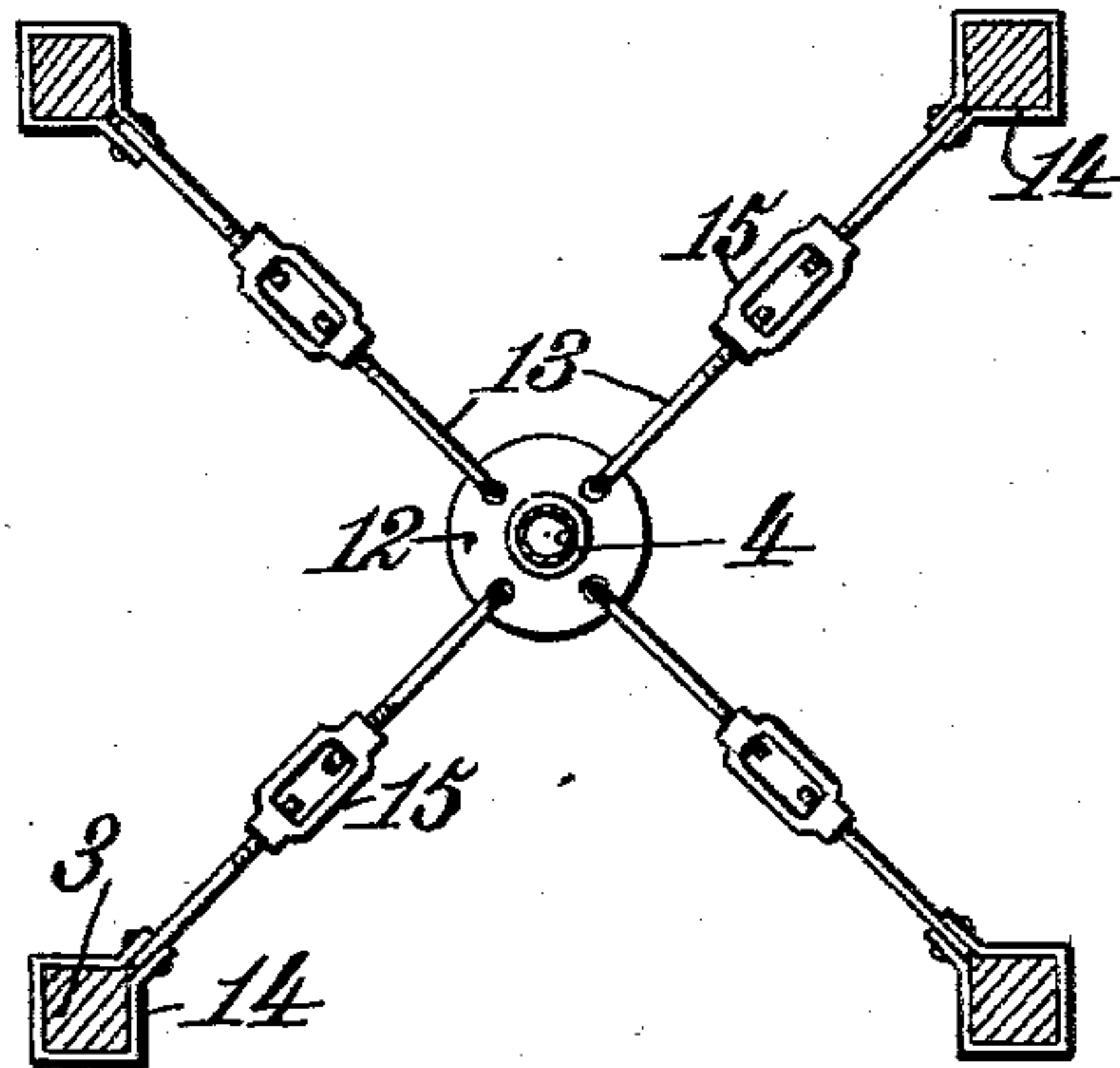
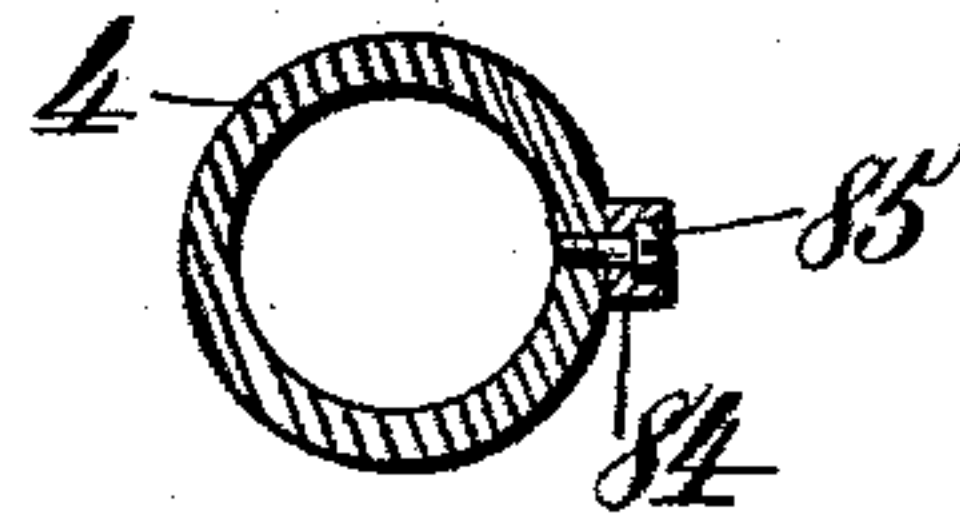


Fig. 9.



Witnesses.
Robert Corbett
John B. Kueper

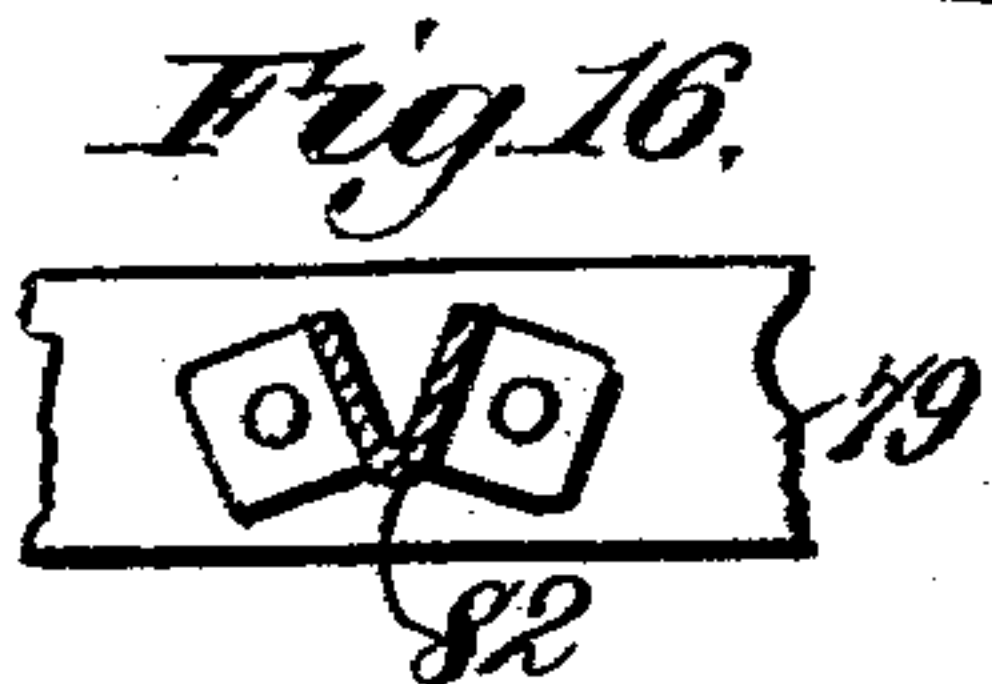
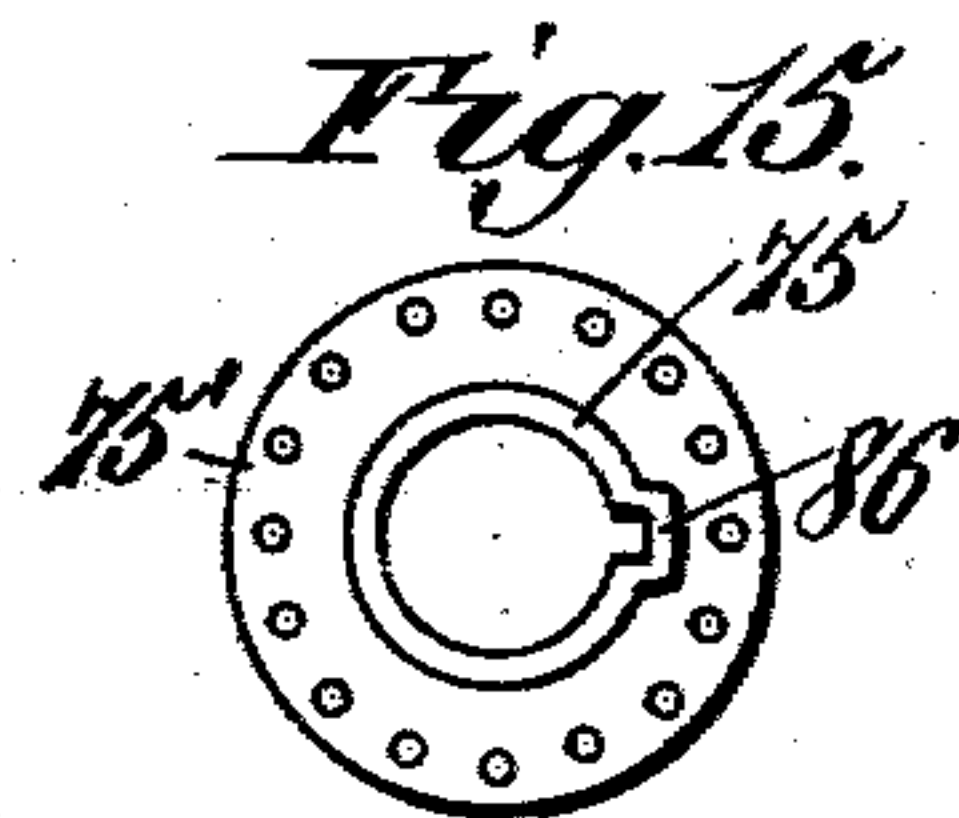
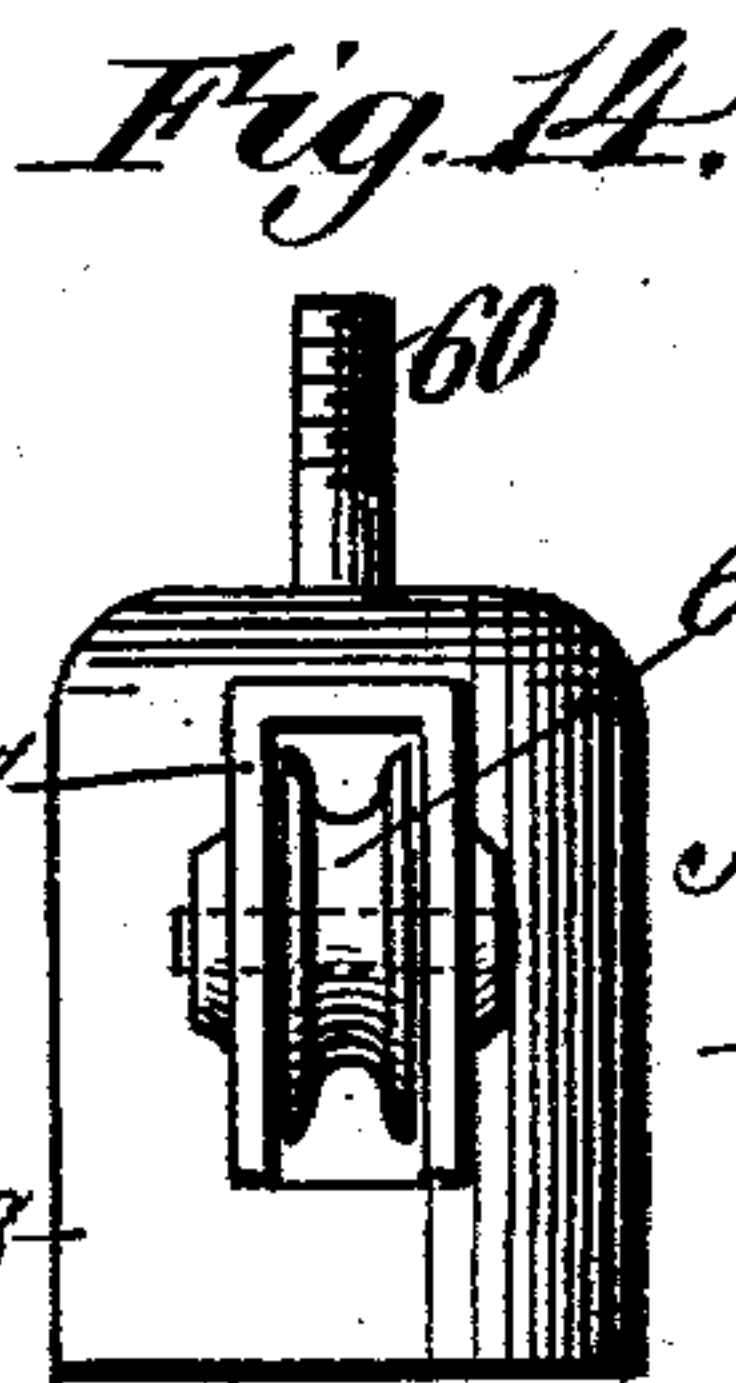
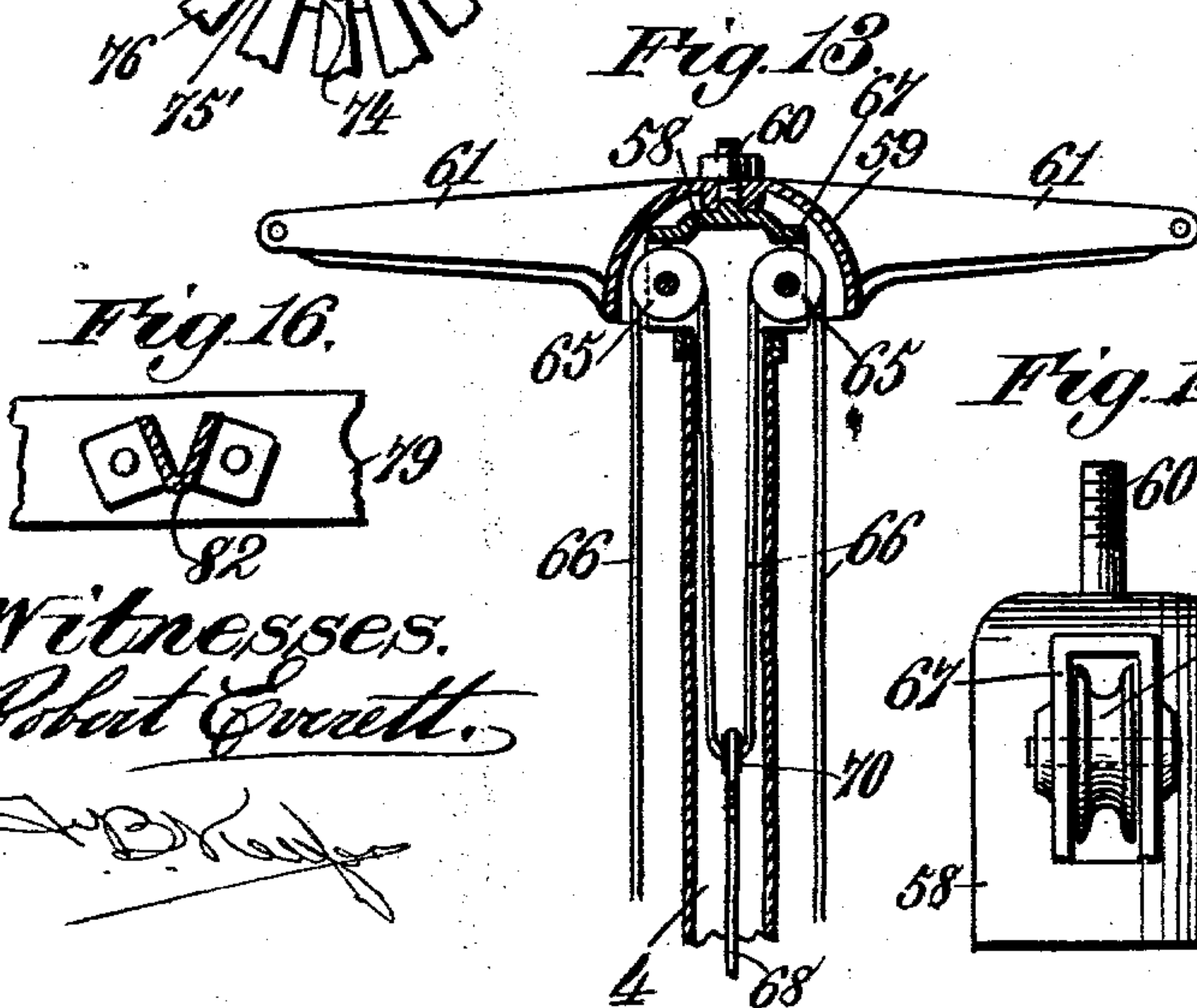
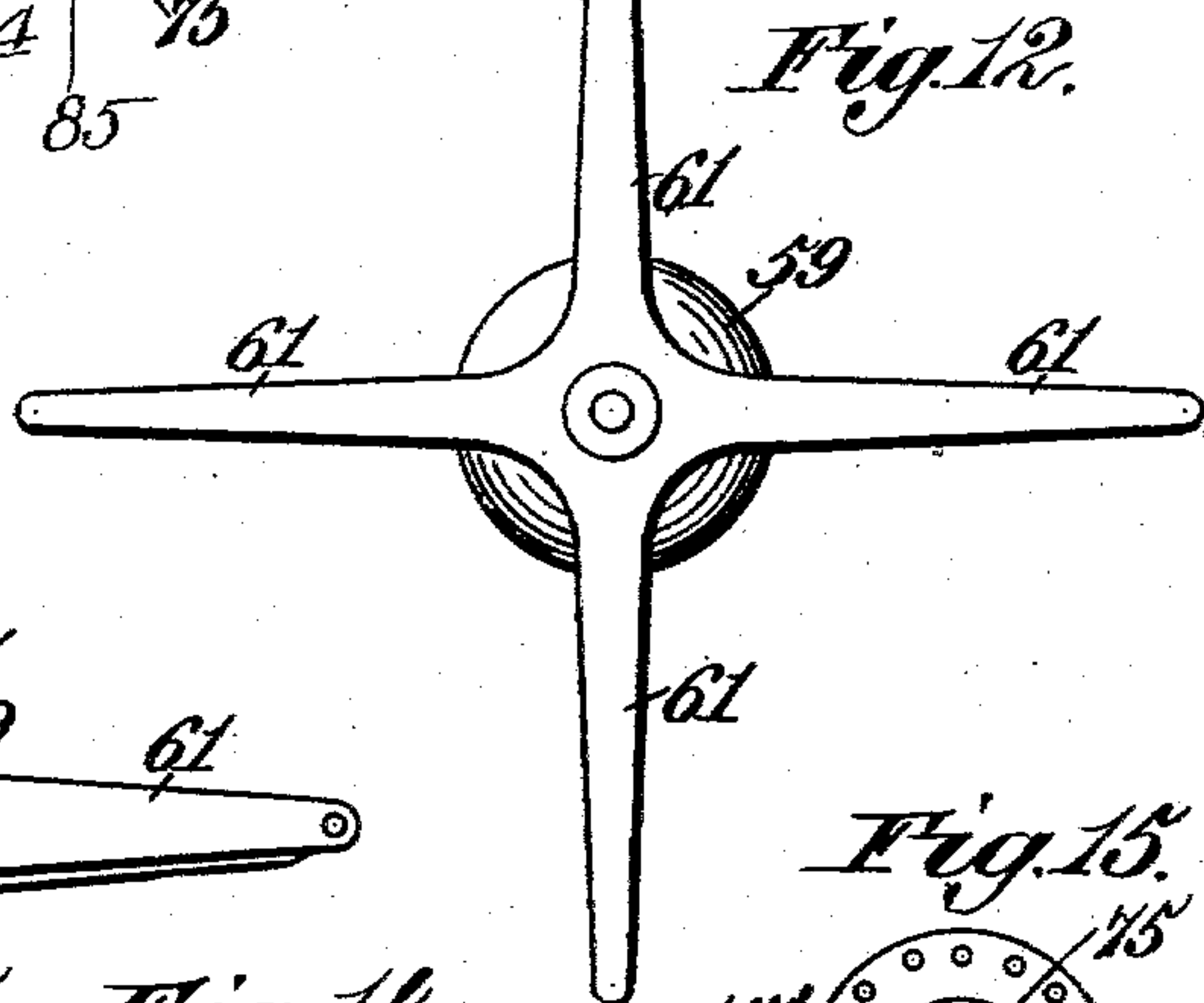
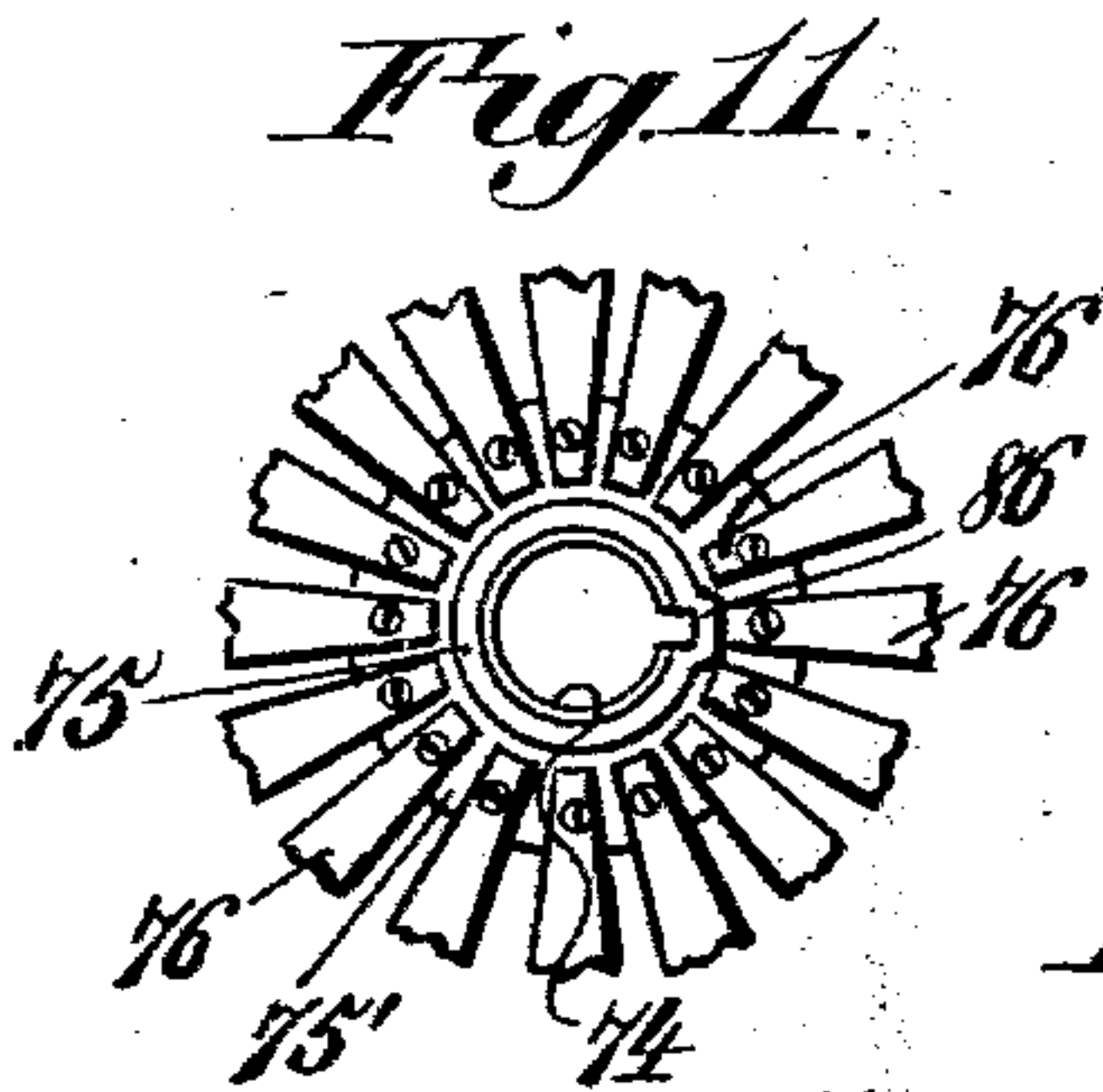
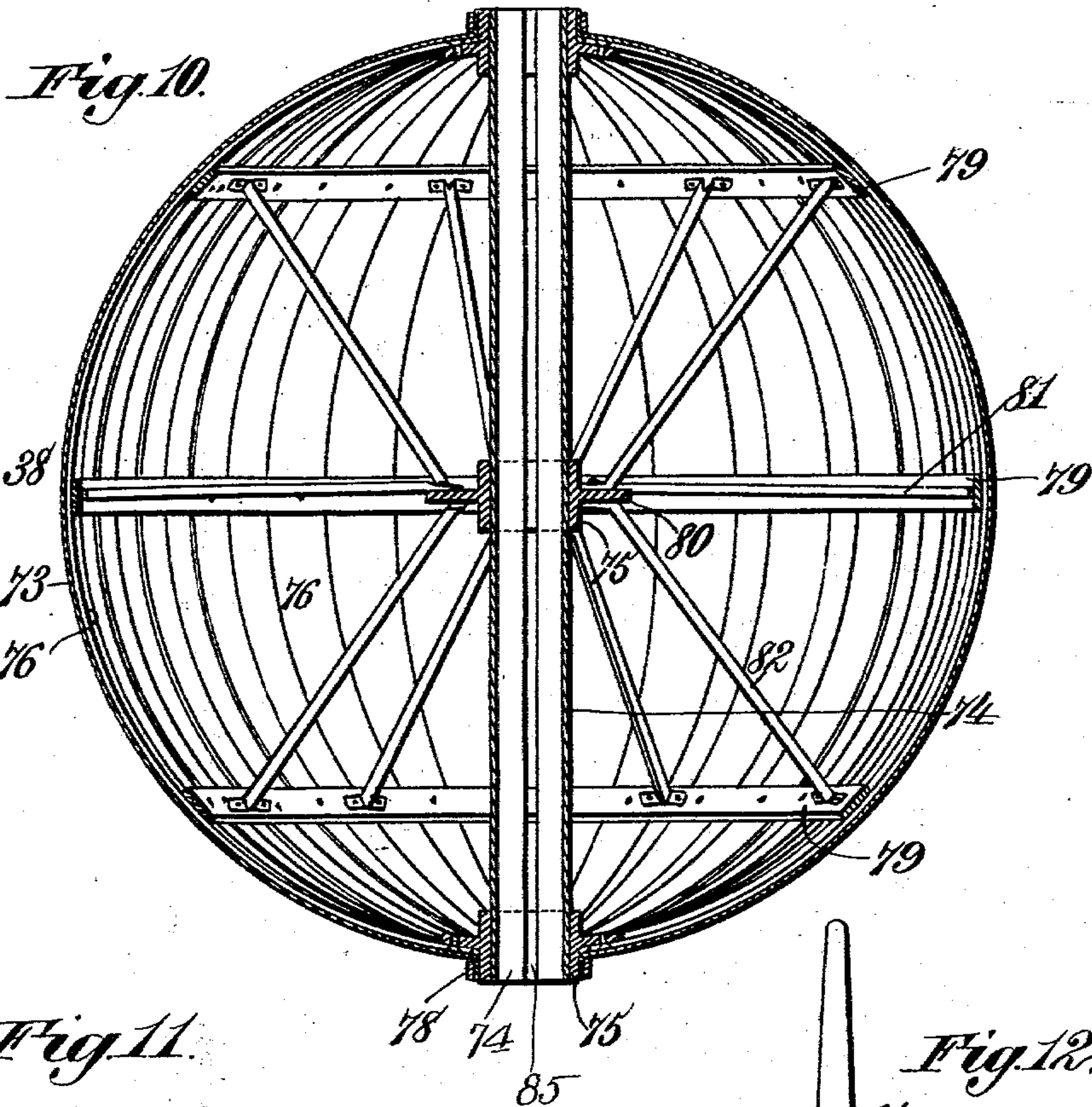
Inventor
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By *James L. Norris*
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A. L. WOODWORTH.
TIME BALL APPARATUS.

[Application filed Nov. 27, 1901.]

(No Model.)

4 Sheets—Sheet 4.



Witnesses.
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UNITED STATES PATENT OFFICE.

ALBERT L. WOODWORTH, OF NORFOLK, VIRGINIA, ASSIGNOR TO T. W. GODWIN & CO., OF NORFOLK, VIRGINIA, A COPARTNERSHIP.

TIME-BALL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 715,230, dated December 2, 1902.

Application filed November 27, 1901. Serial No. 83,894. (No model.)

To all whom it may concern:

Be it known that I, ALBERT L. WOODWORTH, a citizen of the United States, residing at Norfolk, in the county of Norfolk and State of Virginia, have invented new and useful Improvements in Time-Ball Apparatus, of which the following is a specification.

This invention relates to a time-ball apparatus, and its objects and advantages will be set forth at length in the following description, while the novelty thereof will form the basis of the claims appended to such description.

The said invention includes certain peculiarities which are shown in simple and convenient embodiments thereof in the accompanying drawings, forming a part of this specification, and in which—

Figure 1 is a front elevation of a time-ball apparatus including my improvements and with a portion of the shelter-house broken away. Fig. 2 is a sectional front elevation of the housing or casing for the ball, the latter being shown therein. Fig. 3 is an inside face view of a gable of the ball housing or casing. Fig. 4 is a side elevation of a portion of the framing of the ball-housing. Fig. 5 is an under side view of the shutters for the ball-housing. Fig. 6 is a sectional plan view of the ball-housing. Fig. 7 is a similar view of an adjusting means for the ball staff or mast. Fig. 8 is a longitudinal central section of the staff or mast, taken at the joint between its respective sections. Fig. 9 is a cross-section of said staff. Fig. 10 is a central vertical section of a ball. Fig. 11 is a plan of the top of such ball. Fig. 12 is a similar view of a hood. Fig. 13 is a longitudinal central sectional elevation of the hood, sheave head, and upper portion of the staff, together with certain coacting parts. Fig. 14 is a side elevation of the sheave-head. Fig. 15 is a plan view of one of the superposed rings of the time-ball. Fig. 16 is a cross-section of a brace of the ball.

I desire to state at this point that the invention is in no wise limited to the precise parts nor to their arrangements in the manner hereinafter set forth, for many changes may be made within the scope of my claims and that certain of the terms employed are

to be used in their generic sense to embrace equivalent elements or structures.

The apparatus is generally mounted at some height, so that the ball as it drops to indicate a certain time may be perceived over a large territory, and in the present case it is shown as mounted on the roof 2 of a building. Said apparatus includes in its organization a shelter-house, as 3, mounted on the roof 2 and suitably secured thereto, and this shelter-house is adapted to contain the mechanism for controlling the raising and dropping of the time-indicating ball, and such mechanism will be hereinafter briefly described.

The staff or mast upon which the time-indicating ball is slidable is denoted by 4, and it is vertically disposed, it passing centrally, or substantially so, through the top or roof of the shelter-house 3, and said staff or mast may be of any desired height, and its lower end is shown as being about midway of the height of the shelter-house, so that adjusting means for centering the staff are thereby rendered accessible.

The mast or staff in the present case is tubular or hollow, and it is shown as consisting of a plurality of sections, as 5 and 6, suitably connected to each other, so as to form, in effect, a unitary structure. It will be seen that two of such sections are provided; but this number may be increased or one of them may be omitted to suit different cases or conditions. The sections 5 and 6 are united by a tubular coupling, as 7, (see Fig. 8,) which is externally threaded its complete length and which is screwed into the counter-bored and interiorly-threaded upper end of the lower section 5 of the staff or mast for about half its length, after which it is held rigidly by suitable means—as, for example, by the pin 8 passing through the respective parts. After thus seating the tubular coupling the upper section 8, counterbored and internally threaded at its lower end, is screwed onto the projecting portion of said coupling and until its lower end engages the upper end of its mate. When thus assembled, the mast or staff can be passed through a central hole in the top of the shelter-house 3, and in itself it presents a thoroughly-rigid struc-

ture. The pin 8 of course prevents the tubular coupling 7 from turning when the section 6 is connected with said coupling. The tubular sections are smooth interiorly, and the coupling or thimble is likewise finished, its inner surface merging into those of the sections 5 and 6, so as not to chafe or wear the halyard, that raises the ball, which extends the entire length of the staff. It will be seen that said coupling 7 is made bell-mouthed at its opposite ends to secure the requisite inside surface.

As the mast above the house is subjected to high winds, I provide means for holding the same in an upright or perpendicular position. The said staff or mast just above the shelter-house 3 is embraced by the clamp 9, Fig. 6, which clamp has a plurality of arms, as 10, extending equidistantly therefrom, and four of these arms are shown, they being rigidly fastened by means of bolts, as 11, passing through the roof of the shelter-house. Other means are provided for aiding the clamp in holding the staff in the desired upright position, the same being located in the shelter-house. Said staff or mast has a base 12, Fig. 7, shown as a flange perforated to receive the hooks of stay devices, as 13, four of such stay devices being shown as radiating from said base and having clamps, as 14, at their outer ends embracing the four corner-posts of the shelter-house. The means described holds the staff or mast against vibration. The stays 13 each consists of two parts united by a turnbuckle, as 15, and when the staff is mounted these turnbuckles may be manipulated, so as to assure the absolute vertical positioning of the same.

The shelter-house 3 is surmounted by a housing or casing for the time-indicating ball, which is designated in a general way by 16, and this housing includes in its make-up a skeleton or open framing, preferably made of tubing or piping for lightness.

The framing just alluded to has corner-posts, as 17, placed in rectangular order and having circular feet, as 18, Fig. 6, resting on and suitably secured to the roof of the shelter-house. The said feet have couplings, as 19, provided with upwardly and inwardly disposed diagonal branches to receive the similarly-disposed tubular brace members 20, while the main portion of said couplings receives the vertical corner-posts of the housing 16. The tops of said corner-posts receive the main portion or bodies of couplings, as 21, having right-angular branches to receive the cross-pieces 22, while between such bodies and right-angular branches of the couplings are downwardly and inwardly extending branches to receive the correspondingly-disposed brace members 23. The inner ends of the brace members 20 and 23 are connected by the branches of the substantially X-shaped coupling 24, Fig. 2. The bodies of the couplings 21 have other right-angular branches or bosses to receive the cross-pieces 25.

The tubes or brace members 20 and 23 and top cross-pieces 22 are located at the front and back of the housing 16, while the tubes or top cross-pieces 25 are located at the opposite sides of the housing, and said sides are strengthened by the diagonally-disposed struts or braces 26, Fig. 4, running from the upper ends of the forward posts 17 to the bottoms of the rear posts 17, and such struts may have offsets, as 27, at their ends, riveted or otherwise fastened to said posts. The several couplings which unite the members of the framing may be connected thereto in any convenient manner either by thread, braze, or driving-fit joints.

The housing 16 has a roof, and in the present case the same consists of the swinging shutters 28 and 29, two of such shutters being shown, and they turn upon the top pieces 25 of the housing-framework, said shutters having on their under sides suitable hinges, as 30, fastened in some convenient manner thereto and shown as being of the strap type and as having eyes at their outer ends, through which the tubes 25 pass, the latter thereby serving as pivots for the hinges.

The shutters 28 and 29 when down or closed are sustained by gables, as 31, which are fastened in suitable manner to the framing of the housing 16. Said gables are shown as provided on their inner sides with clips, as 32, Fig. 3, to embrace the cross-pieces 22 at the front and back of the housing, respectively.

The shutters 28 and 29 when closed, as shown in Fig. 2, are disposed at obtuse angles to each other, so as to shed water, and the inner edge of one of them overlaps the other when shut, so as to provide a joint to exclude the elements.

The gables, which are preferably of sheet metal, as are also the shutters, have their upper sides converging toward the apexes thereof, and said shutters rest on these converging sides, and one of the sides of the gable (herein shown as the right) is recessed, as at 33, to receive the corresponding shutter 29, the inner edge of the latter fitting snugly against the inner wall of the recess. The companion shutter 28 has at its inner end the extension 34, Fig. 5, to lap over and well beyond the inner edge of the shutter 29, so as to secure an absolutely-tight and weather-proof joint.

The inner edges of the shutters have complementary part-circular apertures or notches, as 35, the walls of which surround the staff or mast 4 when the shutters are closed or down. The shutters, therefore, present, in effect, a central opening, and when they are down it is necessary to prevent the entrance of rain, sleet, or snow through such opening, and as a means for accomplishing this result I provide the shutters upon their upper sides with sheet-gum or similar packing material, as 36, Fig. 2, which surrounds said opening and hugs the staff above the shutters, and thereby closes such central opening.

As a means for stiffening or strengthening

the sheet-metal shutters they are provided on their under sides with longitudinal and suitably-spaced ribs, as 37, the upper ones of which, Fig. 5, conform to the shape of the inner edges of said shutters, and such ribs are angular or L-shaped in cross-section.

The ball is designated in a general way by 38 and normally is contained in the housing 16, the latter having a receiver, as 39, for said ball. Said receiver is shown as consisting of a cylinder surrounded by the framing of the housing and is preferably made of sheet metal. The cylinder is fastened suitably at its bottom to the inner face of the web of an L-shaped foot 40, of annular form, and which is supported by the roof of the shelter-house 3, Fig. 2. The cylinder 39 is split, as at 41, its entire height, and the edges of the cylinder are brought into abutment at this point, and the joint is covered by a metallic strip or plate, as 42, bolted thereto, the heads of the bolts being inside the cylinder and being countersunk in its wall, so that the latter presents a smooth surface. The annular foot 40 consists in the present case of three parts, two main ones, as 43, which abut at or near the dividing-line 41 and nearly half-circular, and a short or filling piece 44 diametrically opposite said dividing-line 41.

By reason of the construction of the cylinder 39 and its base 40 the same can be placed in position around the staff or mast 4 even after the latter has been set up, thereby avoiding the necessity of passing the staff through the cylinder from above the same, as has heretofore been done. To place said cylinder in position, the strip or plate 42 being off the same and the filling-segment being out of its position, the cylinder can be opened at the line 41 a distance slightly exceeding the diameter of the staff and pushed along the roof of the shelter-house, the staff passing through such opening, after which said cylinder can be closed. The filling-piece 44 being out, the cylinder can be readily opened and bent along the back part, so as to be readily put in place, and when it is in position, with the staff extending centrally thereof, the opening at the front will be closed and the plate 42 put on, after which the filling-piece 44 will be inserted between the butt-ends of the sections 43 and then fastened. The cylinder may be held in place by suitable fastenings to the roof of shelter-house, and cement or like substance, as 45, may be placed upon the roof of said shelter-house, which partially covers the clamp 9 (see Fig. 2) and extends to the wall of such cylinder. The upper side of this cement-bed, which constitutes, in effect, a bottom for the cylinder, slopes outwardly and downwardly from its center, so as to carry off any water which may be in said cylinder and which is discharged therefrom by the pipe 46, passing through the same.

The gables 32, of course, protect the front and back of the housing against the admission of water or the like thereinto, the sides

for a like purpose having the plates 47 fastened to the couplings 21 and extending below the upper edge of the cylinder 39.

To prevent the ball from possible injury when dropping from a point above the cylinder 39 into the same, the upper edge of said cylinder flares slightly outward or is rounded, as at 48, so that a sharp edge is avoided, which might be struck by the ball and the latter thereby damaged.

The diameter of the cylinder 39 slightly exceeds that of the ball, so as to provide a clearance-space between the two parts and naturally avoid frictional resistance between the same during the descent of the ball. The air in the cylinder, however, when the ball enters the same cushions said ball to a considerable extent, and such air, as the ball falls well into the cylinder, escapes upward between such parts through the clearance-space, to which reference has been made.

The shutters 28 and 29 are opened or lifted, and in the present case these operations are secured by independent means readily accessible from the roof 2 of the main building upon which the apparatus is placed, so that it is unnecessary to climb to the top of the shelter-house 3, as is ordinarily the case, to actuate said shutters, this being a difficult and dangerous undertaking during snowy, sleety, or windy weather.

The shutters 28 and 29 have upon their upper sides the arms 50, Fig. 2, extending outwardly and slightly upwardly therefrom and which carry adjustable weights, as 51, intended to counterpoise the respective shutters, so as to reduce as much as possible the power to operate the same, said shutters being in practice quite heavy. To the outer ends of these arms or levers 50 ropes or cords, as 52, are connected, the lower ends of said ropes or cords being at or near the roof 2, and said ropes or cords serve as a means for lifting or opening the shutters. Attached to the opposite ends of the shutters are bridles or checks, as 53, connected also to brackets, as 54, upon the outer faces of the gables 32. The bridles or checks are shown as consisting of chains, one end of each engaging over a hook on the coacting bracket 54, and the opposite ends thereof are suitably connected to the ends of the shutters at about the middle thereof. Said checks or bridles serve to prevent the shutters from being opened too far, and they also take up the shock as said shutters reach their wide-open positions, as shown in Fig. 1. The bridles 53 are automatic, for they assume looped positions when the shutters 28 and 29 are closed and are tightened when shutters are opened without extraneous aid.

To the bridles 53 at the front of the apparatus are connected ropes or cords, as 55, which depend therefrom, and the lower free ends of which are near the roof 2, such ropes being joined to the bridles at about their middles.

In Fig. 1 the shutters 28 and 29 are shown

as open, they being thus held and against closing by the wind by winding the ropes 52 around the cleats or projections 56 upon the sides of the shelter-house. To close the shut-
 5 ters the ropes 52 will be freed from the cleats 56 and the ropes 55 pulled down, and to prevent slamming of the shutters they may be held back by the ropes 52. The ropes 55 may be wound upon cleats or projections 57 upon
 10 the shelter-house 3. To open the shutters, it is necessary simply to draw down the ropes 52.

The staff or mast has a sheave-head, as 58, at its upper end, the under side of said block having a central tapped opening to receive
 15 the upper threaded end of said staff, and the head is surmounted by a hood 59, these parts being shown as independent, and the head is inclosed by the hood and has a prolongation 60, Figs. 13 and 14, for holding the hood in
 20 place. This prolongation is shown as a stud passing through a central perforation in the hood and is preferably made integral with the sheave-head, which is generally cast. The
 25 prolongation or stud above the hood is threaded to receive a nut. The hood consists, preferably, of a casting, and it has a plurality of radial arms, as 61, Fig. 12, to the outer ends of which the stay-wires or cables 62 are con-
 30 nected, the lower ends of the stay-wires being held fast in some suitable manner and serving to steady the upper part of the apparatus. The radial arms 61 are preferably made in one piece with the hood 59. The head 58 is
 35 pocketed in its opposite sides to receive the sheaves 65 and over which sheaves the halyard 66 passes, the sheaves being surrounded by the lip or flange 67, Fig. 14, which causes the branches of the halyard to remain in the
 40 grooves of the respective sheaves and naturally prevent fouling of the same or chafing. Hence friction is reduced.

A cord or like connection, as 68, is inclosed by the tubular or hollow mast 4, it passing from the lower end of said mast and being
 45 governed by a suitable actuating and controlling appliance, as 69, in the shelter-house 3. This cord 68 has an eye, as 70, at its upper end, through which the halyard, substan-
 50 tially at the center of its length, passes. The halyard is then doubled on itself in the tubular staff, and its branches extend upward over the respective sheaves and then down-
 ward and are connected at their lower ex-
 55 tremities to the ball 38.

Suitable mechanism, constituting a part of the controlling device 69, will be thrown into
 60 action for drawing down the cord 68, which results in the elevation of the ball 38, and when the same is at the desired height such mechanism will be stopped. At the desired
 moment the ball will be released and will drop by its own weight into its cylinder 39. I have not shown in detail the mechanism for
 65 securing the ascent and descent of the ball, having simply indicated the same by its conventional illustration in Fig. 1. This mechanism may be of any suitable kind, it being

preferably electrically operated to secure quick action.

The cord before it enters the casing of the
 70 controlling device 69 passes over the guide-roller 70.

One of the arms 61 of the hood carries a block, as 71, provided with a rope 72, permanently secured thereto, and by which rope
 75 workmen may reach the top of the mast at any time should this be necessary.

The ball 38 is shown in detail in Fig. 10, and it is of skeleton form, it being generally covered with canvas 73, exteriorly painted,
 80 and its body is denoted by 74 and consists of a tube adapted to embrace and slide upon the staff 4. The tube 74 is surrounded at its top, bottom, and middle by rings, as 75,
 85 suitably fixed in place. The upper and lower rings 75 have circumferential flanges, as 75', slightly curved inward and to which the
 approximately semicircular ribs or staves 76 are fastened, screws 77, Fig. 11, being pre-
 90 ferably employed to unite the parts. The extreme ends of these ribs are offset, as at 77, the offsets being laid against the ends of the
 upper and lower rings 75 and being encircled by the narrow bands 78, which bands
 95 also grip the canvas covering 73, so as to hold the latter on, it being understood that the upper and lower edges of such covering are
 between the respective offsets and bands. The ball incloses the superposed flat bands
 100 79, suitably fastened thereto and three being shown, the middle one being on a line with the middle ring 75. Said middle ring has a
 circumferential flange 80, to which the angular braces 81 are riveted, the outer ends of
 105 the braces being split, and the branches of such split ends are riveted to the inner face of the middle band 79. The angular braces
 82 are likewise attached to the said flange 80 of the middle ring and extend angularly up-
 110 wardly and downwardly and outwardly to the upper and lower bands 79, the several bands being so disposed as to equally strengthen
 the ball throughout its entire area.

The ball 38 should be held against rotation on its staff, as in case it does turn the hoist-
 115 ing-halyard 66 is likely to be twisted, and to prevent this rotation the staff or mast 4 has a feather or spline, as 84, extending along the same for a distance equaling the travel of the
 ball 39, and this feather is attached, prefer-
 120 ably, by screws, as 85, to the mast, the heads of the screws being countersunk in the feather, Fig. 9, so as to avoid protuberances upon the outer face thereof. This feather
 125 enters a slot 85 in the tube 74, the fit being a very free one and the slot extending the entire length of the tube, so that the ball can have a very rapid and free descent upon its
 staff, but is prevented positively from turning thereon. The rings 75 have also offset
 130 portions 86 to receive the feather.

The ball by reason of the construction set forth is of sufficient stability to prevent col-
 lapsing thereof when it strikes the bottom of

the cylinder 39 or when it cushions upon the air confined in said cylinder.

The operation of the apparatus will be at once obvious from a reading of the foregoing description, in connection with the annexed drawings. Briefly set forth, it is as follows: A few minutes before a given time the shutters 28 and 29 are opened by pulling down the ropes 52, and the ball 38 is then lifted to the top of its staff 4 and there held until automatically released, when it instantly drops into its cylinder, after which the shutters are closed by pulling on the ropes 55.

Having described the invention, what I claim is—

1. In an apparatus of the class described, a ball including a tube having rings at its ends and an intermediate ring all of the rings being flanged, a plurality of circular ribs the ends of which lie against the flanges of the end rings, means on the end rings for holding said ends, a plurality of superposed bands against the inner faces of the ribs, and braces connected with the flange of the intermediate ring and also with the bands.

2. In an apparatus of the class described, a ball including a tube having rings at its ends and an intermediate ring all of the rings being flanged, a plurality of part-circular ribs the ends of which lie against the flanges of the end rings, bands encircling the ends of said ribs, a plurality of superposed rings fastened to the inner faces of the ribs, and braces connected with the flanges of the intermediate ring and also with said superposed bands.

3. In an apparatus of the class described, a ball including a tube having rings at its ends and an intermediate ring all of the rings being flanged, a plurality of part-circular ribs the ends of which lie against the flanges of the end rings, bands encircling the ends of said ribs, a plurality of superposed rings fastened to the inner faces of the ribs, braces connected with the flange of the intermediate ring and also with said superposed bands, and a covering for the ribs held in place by said first-mentioned bands.

4. In an apparatus of the class described, a staff having a sheave-head and a hood for the sheave-head separate therefrom and the sheave-head having a prolongation to pass through a hole in the hood, and said hood having arms to which stays or guys may be connected.

5. In an apparatus of the class described, a staff having a sheave-head and a hood for the sheave-head separate therefrom and the sheave-head having a threaded stud passing through a hole in the hood, and a nut on the threaded portion of the stud.

6. In an apparatus of the class described, a housing for a time-ball having a skeleton frame and shutters for the housing provided with hinges having eyes to receive certain members of the frame which constitute pivots therefor, and the shutters having complementary recesses at their inner edges.

7. In an apparatus of the class described, a housing for a time-ball having tubular corner-posts provided with couplings, brace members connected with said couplings, an X-shaped coupling uniting said brace members, other braces connected with the corner-posts, cross-pieces at the top of the housing, couplings at the upper ends of the corner-posts to which said cross-pieces are connected, and shutters swinging on certain of the cross-pieces and having complementary recesses at their inner edges.

8. In an apparatus of the class described, a housing for a time-ball, having a cylinder provided with a base-piece, the cylinder being split or divided its whole height and the base-piece consisting of a plurality of parts, and a strip covering the dividing-line of the cylinder.

9. In an apparatus of the class described, a housing for a time-ball, having a cylinder provided with an annular base-piece the cylinder being split or divided its whole height and the base-piece consisting of a plurality of pieces one of which is shorter than the others and is located at a point diametrically opposite the split or dividing-line in the cylinder.

10. In an apparatus of the class described, a shelter-house, a housing for a time-ball, above the shelter-house, a staff for said time-ball projecting through the housing and down into the shelter-house, a clamp for the staff in the housing, and means in the shelter-house for assisting the clamp in maintaining the staff in an upright position.

11. In an apparatus of the class described, a shelter-house, a housing for a time-ball, above the shelter-house, a staff for said time-ball projecting through the housing and down into the shelter-house, a clamp for the staff, in the housing, and means in the shelter-house for assisting the clamp in maintaining the staff in an upright position, and including a plurality of rods connected with said shelter-house said rods consisting of sections united by turnbuckles.

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

ALBERT L. WOODWORTH.

Witnesses:

GEO. W. REA,
HEATH SUTHERLAND.