No. 616,777.

J. R. FORDYCE.

Patented Dec. 27, 1898.

ROLLER COMPRESS.

(Application filed Apr. 8, 1895. Renewed Dec. 2, 1898.)

(No Model.)

5 Sheets—Sheet 1.

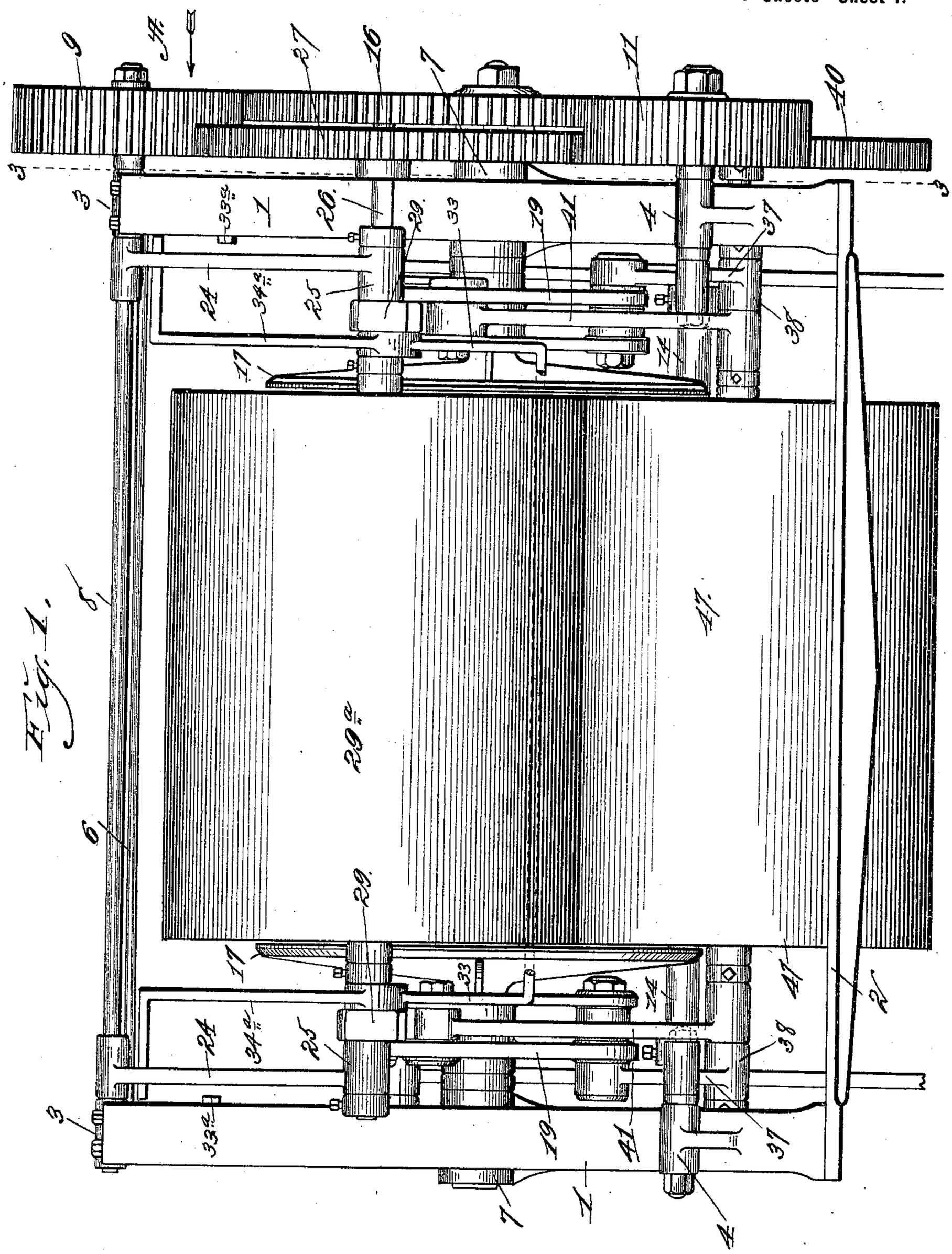

Fig. 1.

Witnesses
W. P. Smith
Maud Griffin

Inventor:-
John R. Fordyce.
by Higdon & Higdon & Longan Attys.

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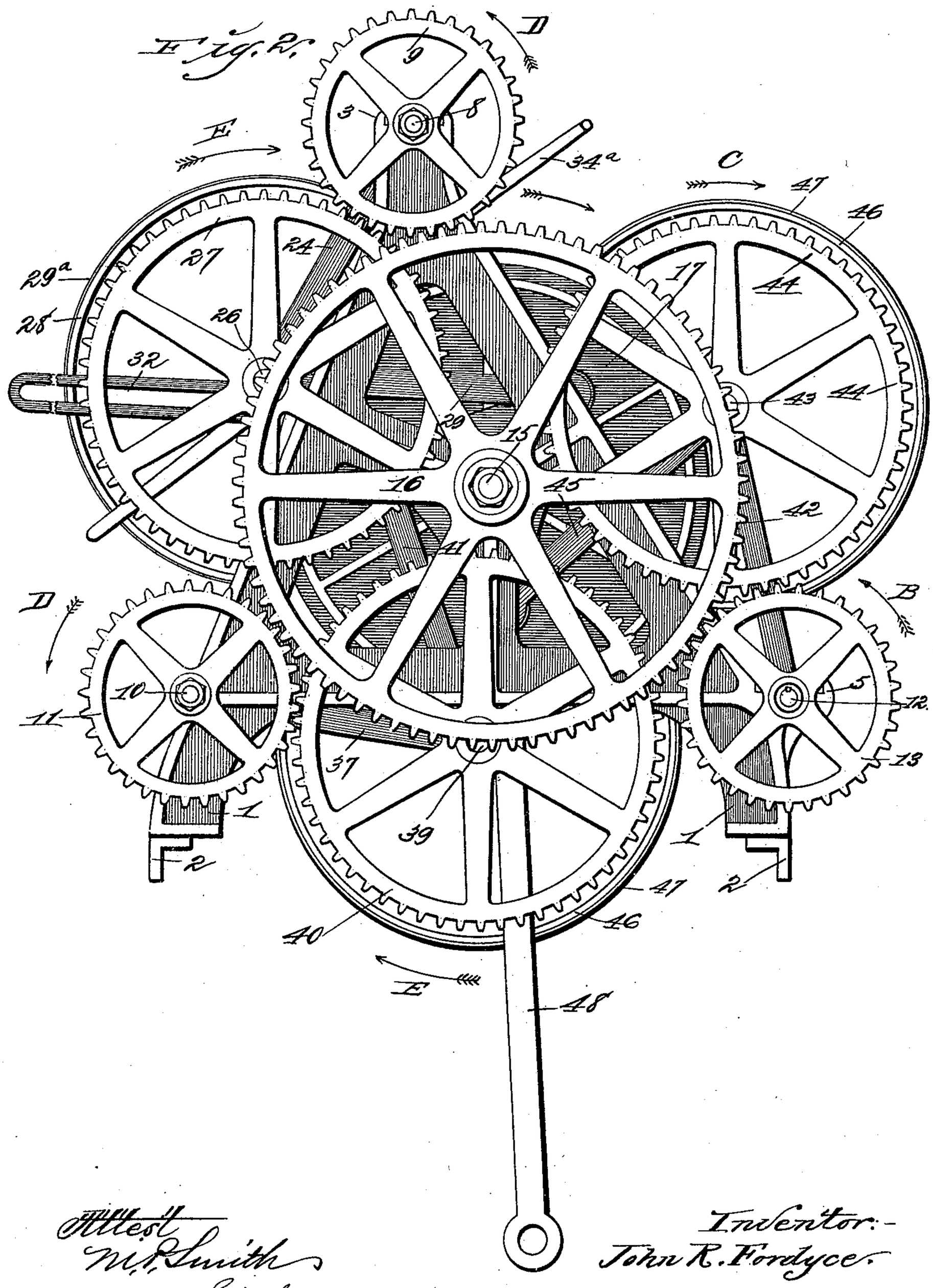
(No Model.) 5 Sheets—Sheet 2.

Fig. 2.



Attest:
M. F. Smith
Maud Griffin

Inventor:-
John R. Fordyce.
by Higdon & Higdon & Longan
Atty's.

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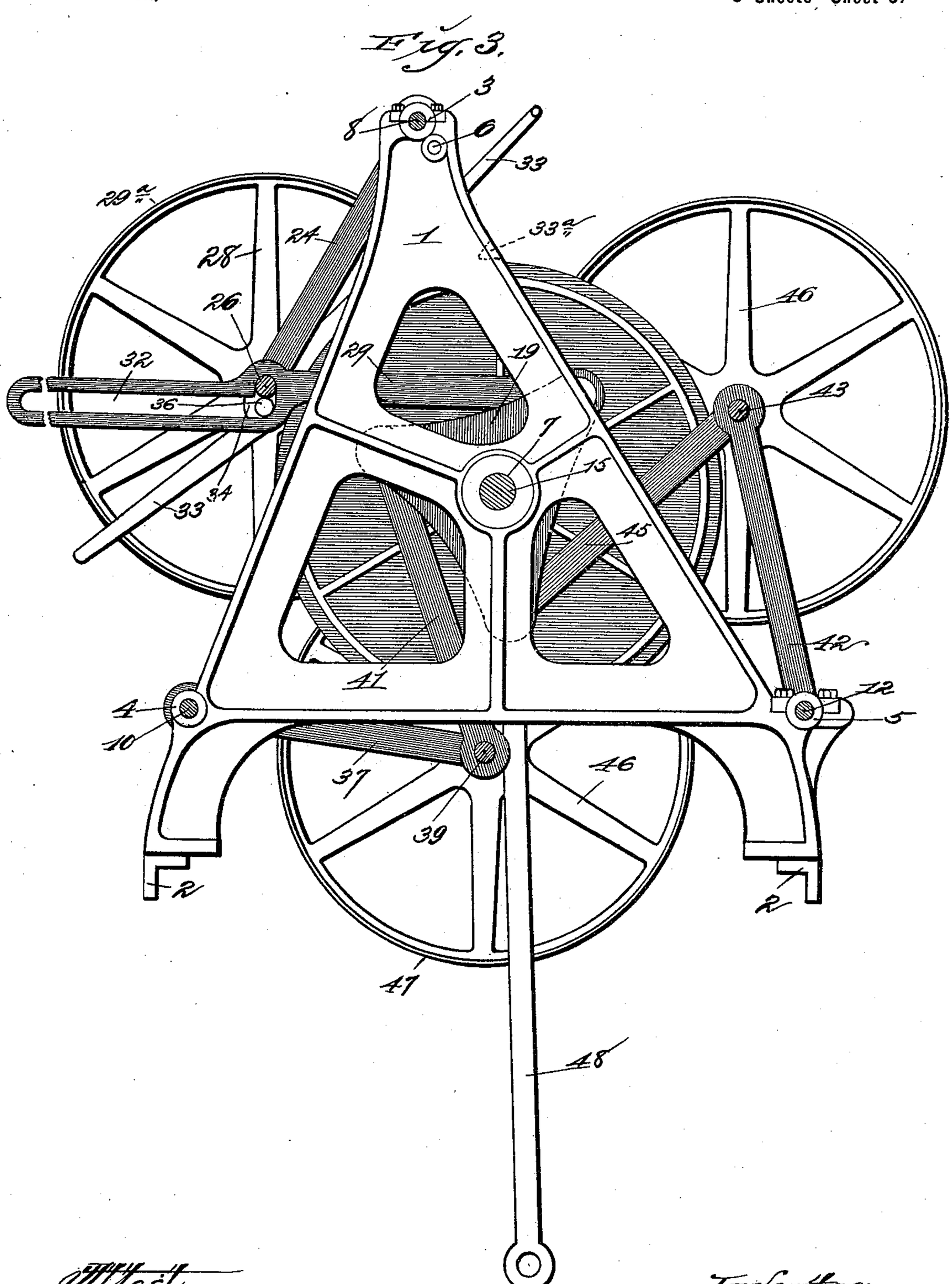
(No Model.) 5 Sheets—Sheet 3.

Fig. 3.



Witnesses
M. P. Smith
Maud Griffin

Inventor:-
John R. Fordyce.
by Higdon & Higdon & Tongan.
Attys

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(No Model.) 5 Sheets—Sheet 4.

Fig. 4.

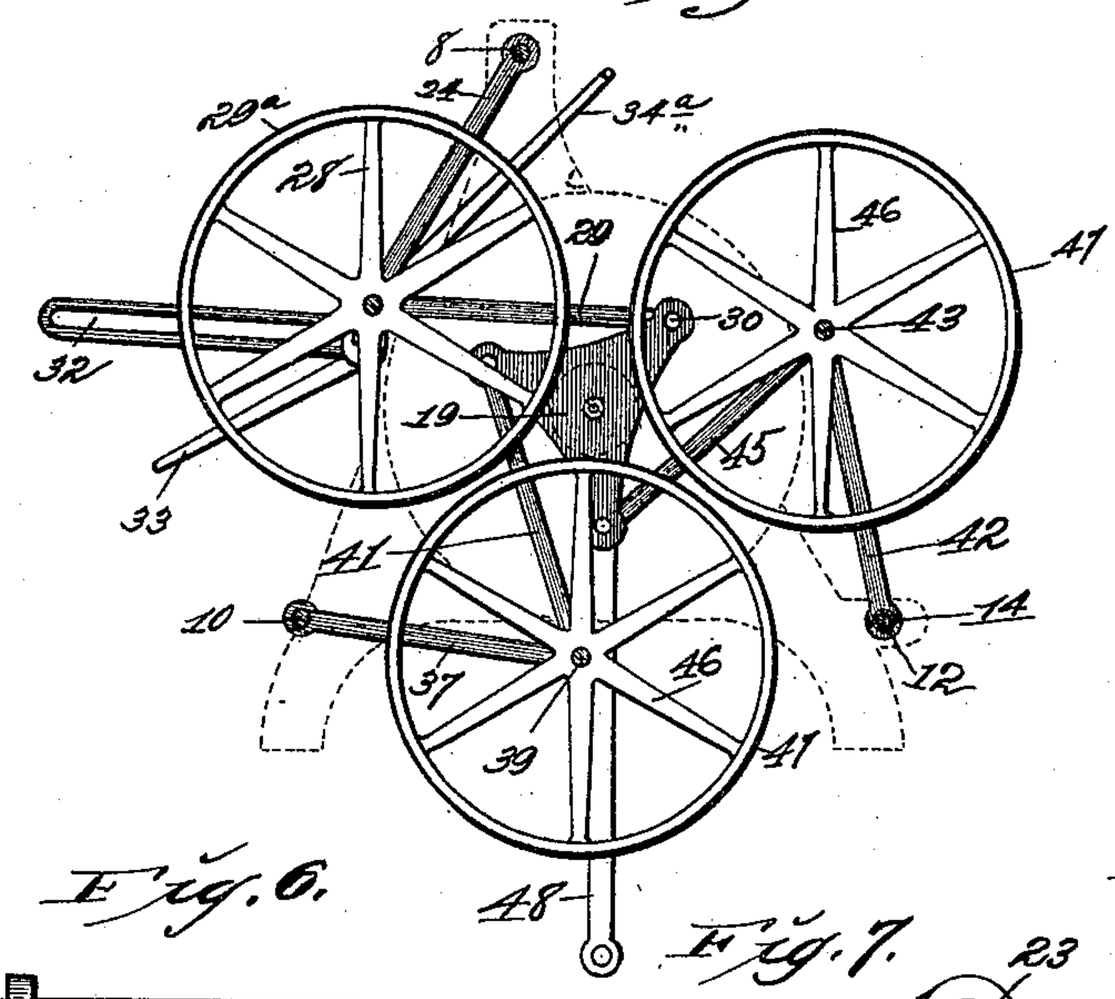


Fig. 6.

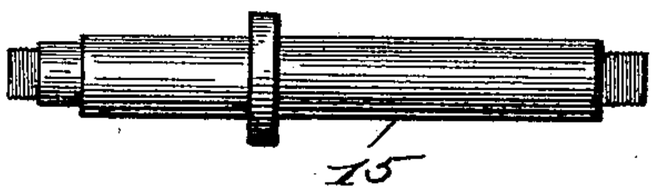


Fig. 7.

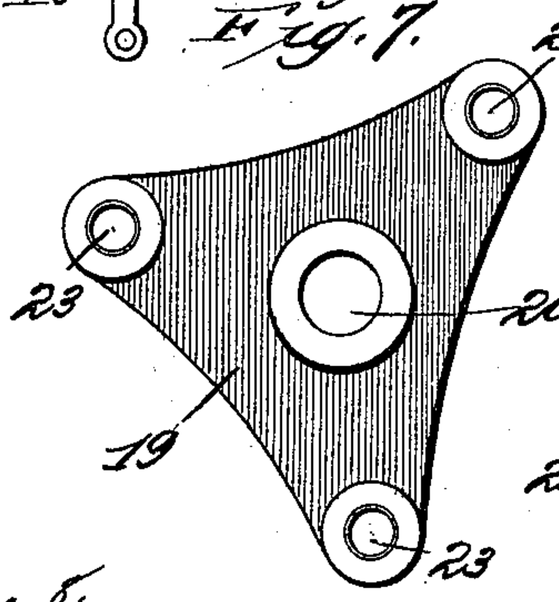


Fig. 8.

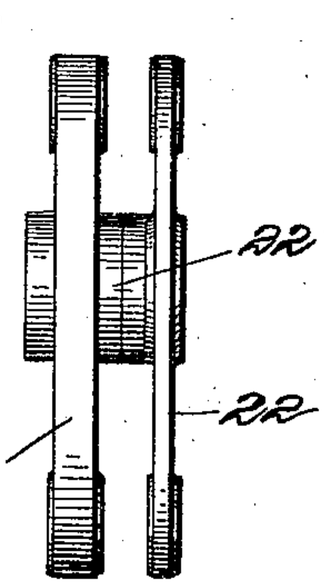
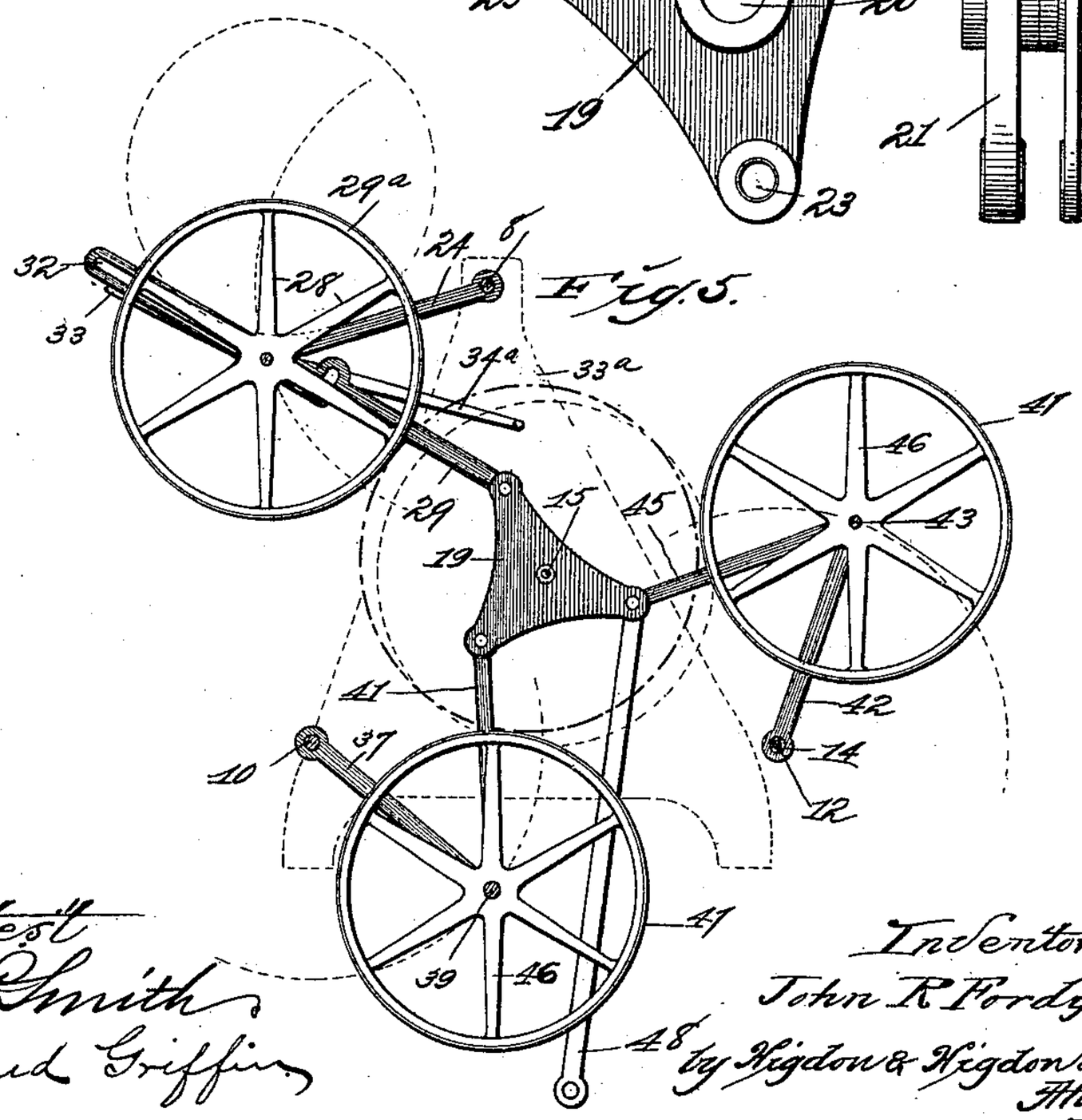


Fig. 5.



Witnesses:
W. L. Smith,
Maud Griffin.

Inventor:—
John R. Fordyce.
by Higdon & Higdon & Longan
Attys.

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Fig. 9.

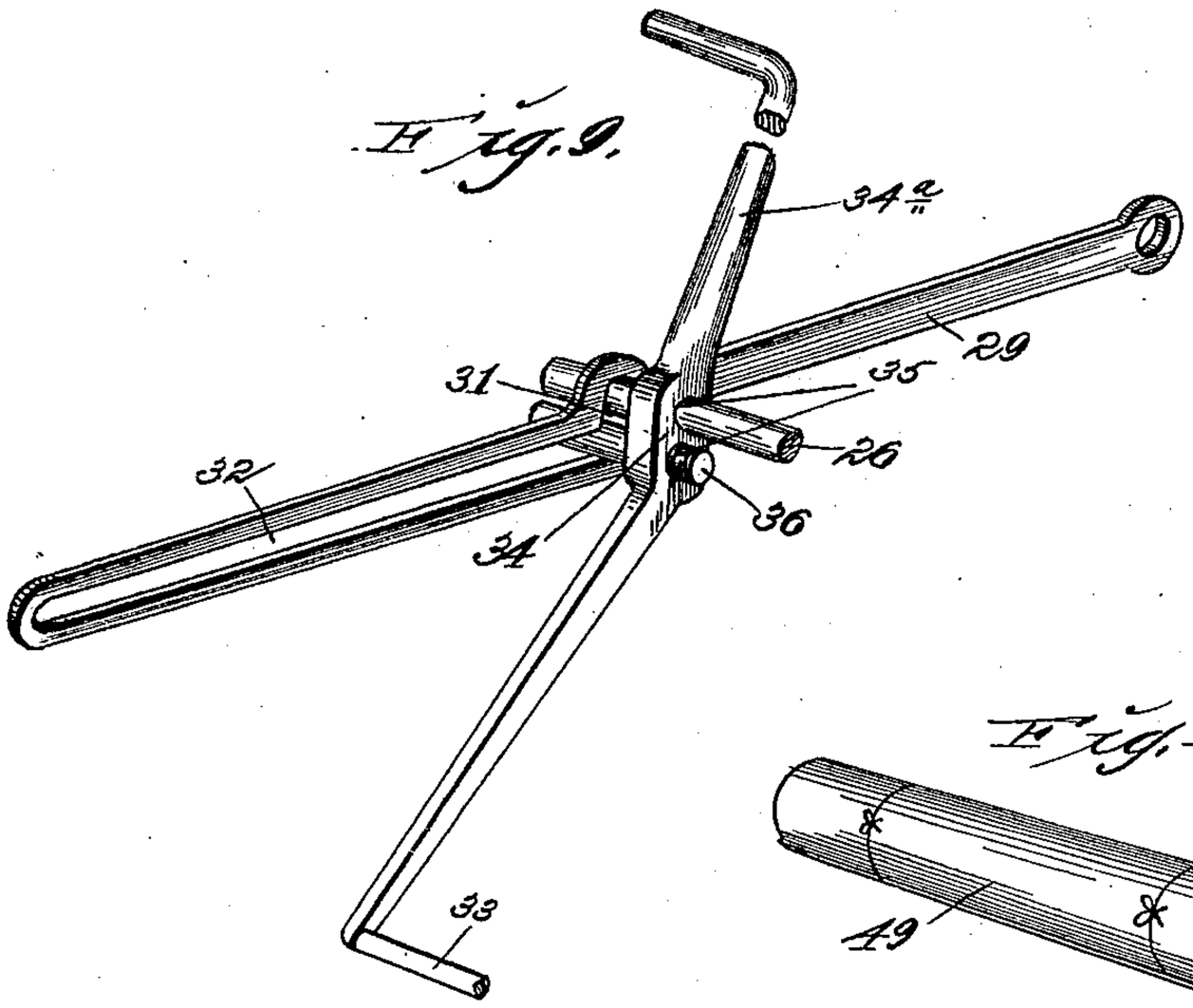


Fig. 13.

Fig. 10.

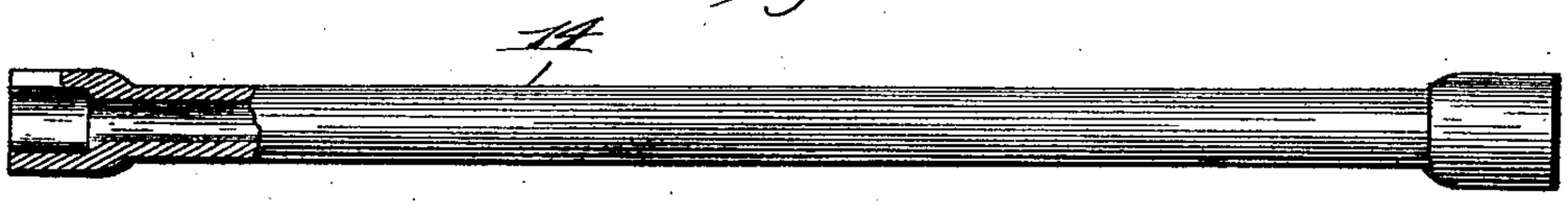


Fig. 11.

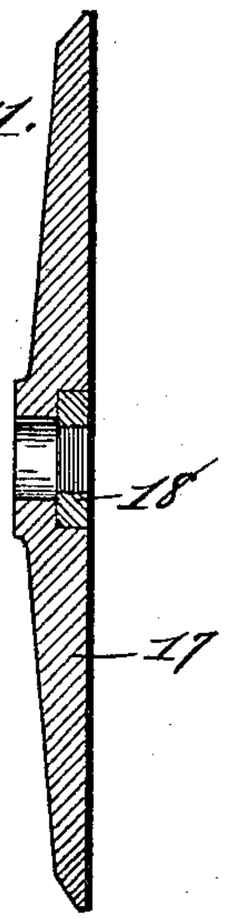
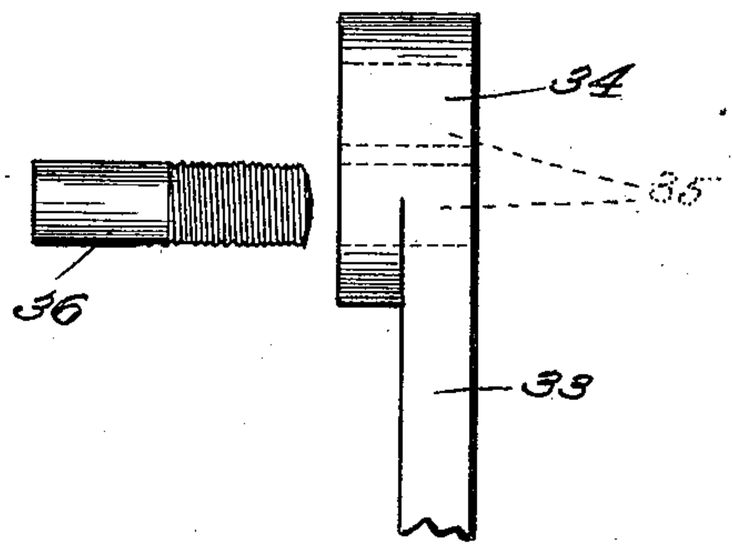


Fig. 12.



Witnesses:
Martin P. Smith
Maud Griffin

Inventor:
John R. Fordyce
by Higdon & Higdon & Longan.
Attys.

UNITED STATES PATENT OFFICE.

JOHN R. FORDYCE, OF ST. LOUIS, MISSOURI.

ROLLER-COMPRESS.

SPECIFICATION forming part of Letters Patent No. 616,777, dated December 27, 1898.

Application filed April 8, 1895. Renewed December 2, 1898. Serial No. 698,122. (No model.)

To all whom it may concern:

Be it known that I, JOHN R. FORDYCE, of the city of St. Louis, State of Missouri, have invented certain new and useful Improvements in Roller-Compresses, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to an improved roller-compress; and it consists in the novel construction, combination, and arrangement of parts hereinafter described and claimed.

In the drawings, Figure 1 is a side elevation of my improved roller-compress. Fig. 2 is an end elevation thereof, said view being taken on the end on which the train of driving-gears are located. Fig. 3 is a vertical sectional view taken approximately on the indicated line 3 3 of Fig. 1 and looking in the direction as indicated by the arrow A, Fig. 1. Fig. 4 is a transverse sectional view through the compression-rollers, and showing the position of said rollers at the commencement of the formation of a bale. Fig. 5 is a view analogous to Fig. 4, showing the compression-rollers in the position they occupy at the completion of a bale and while the same is being discharged. Fig. 6 is a side elevation of one of a pair of stub-shafts or journals of which I make use in carrying out my invention. Fig. 7 is a side elevation of one of a pair of triangular castings, such as contemplated in my invention. Fig. 8 is an edge elevation of said casting. Fig. 9 is a view in perspective of a portion of a locking device I employ in normally holding one of the compression-rollers in proper position. Fig. 10 is a side elevation of a sleeve that is located upon the main or driving shaft of the compress. Fig. 11 is a vertical sectional view of one of the disks of which I make use in carrying out my invention. Fig. 12 is a detail side elevation of the head and removable pin that comprise a portion of the locking device shown in Fig. 9. Fig. 13 is a perspective view of a collapsible core.

Referring by numerals to the accompanying drawings, 1 1 indicate the end frames of my improved compress, the same being triangular in form and that rest upon and are held together by suitable angle-bars 2. In the apices of these triangular end frames are formed journal-bearings 3, the same being in horizontal alinement, and horizontally-alined journal-bearings 4 and 5 are formed, respectively, on the front lower and rear lower ends of said triangular end frames. A tie-rod 6 is rigidly fixed in the apices of and extend from one end frame to the other. Formed in each one of the end frames, near the centers thereof and in horizontal alinement, are journal-bearings 7.

Rotatably mounted in the journal-bearings 3 at the apices of the end frames 1 is a shaft 8, upon one end of which is loosely mounted a gear-wheel 9.

Journaled in the bearings 4 on the front lower ends of the end frames 1 are stud-bolts 10, upon the end of one of which is loosely mounted a gear-wheel 11, which is of the same diameter as is the gear-wheel 9.

Mounted for rotation in the bearings 5 on the rear lower ends of the end frames 1 is a shaft 12, to one end of which is keyed a gear-wheel 13 of the same diameter as are the gear-wheels 9 and 11. This shaft 12 is the main driving-shaft of the compress, and said shaft may be driven by a belt passing over a pulley or in any suitable manner. Located upon said shaft between the journals 5 in the end frames is a sleeve 14.

A stub-shaft or journal, such as 15, is rigidly mounted in each one of the center journal-bearings 7. Mounted upon the outer end of the stub-shaft 15, that projects outwardly on the same side on which the gear-wheels 9, 11, and 13 are fixed, is a gear-wheel 16, the same being approximately half as wide as and meshing with the three gear-wheels 9, 11, and 13. The stub-shafts 15 extend slight distances toward each other through the end frames 1 and have loosely mounted on their inner ends disks 17, the same having smooth inner faces. Washers 18 are set in the inner faces of these disks 17, said washers 18 having screw-threaded apertures in which the screw-threaded inner ends of the stub-shafts 15 engage. Loosely mounted upon these stub-shafts 15, between the end frames 1 and the disks 17, are triangular castings 19, in the centers of which are apertures 20, through which said stub-shafts pass. Said triangular castings are constructed in two parts, such as 21 and 22, connected by integral collars 22^a, and in the cor-

ners of said triangular castings are formed circular apertures 23.

Keyed upon the shaft 8, adjacent the end frames 1 and extending downwardly and forwardly from said shaft, are swinging arms 24, the lower ends of which are formed into journal-bearings 25. Loosely mounted in said journal-bearings 25 is a shaft 26, upon one end of which is rigidly fixed a gear-wheel 27, the same meshing with the gear-wheel 9, located upon the shaft 8. Rigidly fixed upon this shaft 26, between the swinging arms 24, is a series of metallic band-wheels 28, which, together with a covering of sheet metal 29ª in the form of a cylinder, forms one of the compression-rollers of my improved compress.

Arms 29 are pivoted at their rear ends by means of pins or bolts 30 to the triangular castings 19 and between the apertures at the upper ends of the two portions 21 and 22 thereof. Short vertical slots 31 are formed in these arms 29 where they engage the shaft 26, and communicating with the lower ends of these vertical slots 31 are slots 32, that extend longitudinally in the outer ends of said arms 29.

A U-shaped trip-lever 33 has formed integral with its ends heads 34, in each of which is located a pair of horizontally-arranged apertures 35. Through the top pair of these apertures pass the ends of the shaft 26, and located in the lower pair of said apertures 35 are pins 36, that pass through and are normally located in the lower ends of the vertical slots 31. This U-shaped lever 33 extends forwardly and downwardly from the shaft 26, and the horizontal portion thereof lies directly in front of the lower end of the front compression-roller. Formed integral with and extending upwardly and rearwardly from the heads 34 are arms 34ª, having their upper ends turned outwardly and away from one another. Lugs 33ª are formed integral with the inner faces of the end frame and lie directly in the paths of travel of the outwardly-turned ends of the arms 34ª.

Loosely mounted upon the stud-bolts 10, adjacent the end frames 1, are a pair of arms 37, that extend rearwardly to points directly beneath the centers of said end frames, and the rear ends of said arms 37 are formed into journal-bearings 38. Mounted for rotation in these bearings 38 is a longitudinally-extending shaft 39, upon one end of which is keyed a gear-wheel 40, similar in size to the gear-wheel 27, previously mentioned, and said gear-wheel 40 meshes with the gear-wheel 11 on the stud-bolt 10. Arms 41 are journaled upon this shaft 39 and extend upwardly therefrom and have their upper ends fixed in the forward corners of the pair of triangular castings 19.

Rigidly fixed upon the sleeve 14, that is located upon the shaft 12, adjacent the end frames 1 and extending upwardly therefrom, are arms 42, the upper ends of which are formed into suitable journal-bearings and have loosely mounted therein a shaft 43, on the outer end of which is a gear-wheel 44, identical in size and form with the gear-wheels 27 and 40, said gear-wheel 44 meshing with the gear-wheel 13, that is located upon the outer end of the shaft 12. Arms 45 have their upper ends journaled upon the shaft 43, adjacent the outer ends thereof, and extend from thence downwardly and are pivoted to the lower corners of the triangular castings 19.

Located upon the shafts 39 and 43 is a series of band-wheels 46, in every way similar to the band-wheels 28, and said band-wheels 46, together with suitable sheet-metal coverings 47 in the form of cylinders, complete the second and third compression-rollers of my improved compress.

Loosely mounted upon the pins in the lower corners of the triangular castings 19 are arms 48, which may be attached in any suitable manner to weights, springs, steam or hydraulic pistons, or any suitable means for resisting the outward swing of the compression-rollers as the bale increases in diameter.

49 indicates a collapsible core, which may be constructed of any suitable material the same being in the form of a tube and so held by means of cords or in any suitable manner.

The operation is as follows: The shaft 12 is driven at the proper speed in the direction indicated by the arrow B, adjacent said shaft. The gear-wheel 13, mounted upon said shaft 12, will be driven in the same direction, and rotary motion is imparted from said gear-wheel 13 to the gear-wheels 16 and 44. The compression-roller located upon the shaft 43, upon which the gear-wheel 44 is mounted, will necessarily be rotated in the same direction, which is in the direction as indicated by the arrow C, Fig. 2. The gear-wheel 16 on being rotated will impart rotary motion to the gear-wheels 9 and 11, said gear-wheels rotating in the direction as indicated by the arrows D, and rotary motion from said gear-wheels 9 and 11 is imparted to the gear-wheels 27 and 40, said last-mentioned gear-wheels operating in the direction as indicated by the arrow E. Necessarily the compression-rollers located upon the shafts 26 and 39, upon which said last-mentioned gear-wheels are located, will be rotated in the same direction as are said gear-wheels. The cotton or other fibrous material that it is desired to bale is now fed into the compress directly between the two top compression-rollers, and the bale is started between the three compression-rollers, as indicated by dotted lines between said rollers in Fig. 4. This arrangement of rollers forms an inverted pyramid. The forward edge of the bat drops down into the space inclosed by the rollers and onto the lower compression-roller. The forward edge of the bat is carried by the action of this lower roller against one of the opposite upper rollers 28, and by the operation of this roller the bat is rolled back on itself and a core started on which the

subsequent part of the bat is wrapped. By this arrangement the cotton is fed by gravity into the machine, the lower roller acts as a support and prevents the bat from falling below the upper surface of the lower roller, and the formation of the bale is thus made positive and certain and without the aid of a collapsible or other core; also, by the means and manner described the discharge of the bale from the press is greatly facilitated. The first cotton or other material that is being baled is wound around the collapsible core 49, which has been previously placed in the space between the three rollers. As additional cotton is fed in between the two upper rollers this core will collapse or roll up upon itself until it, together with the cotton wound thereon, is of such a diameter as to resist the pressure of the compression-rollers. The amount of weight or spring-power that is located upon the lower ends of the arms 48 regulates the density to which the cotton or other product is compressed, and while the bale is increasing in diameter, by reason of the cotton or other product fed in between the two top rollers, the compression-rollers will move outwardly in the direction indicated by the dotted lines in Fig. 5 or in arcs of circles having their centers in the centers of the shafts 8, 10, and 12. In so moving outwardly during the time the diameter of the bale is increasing the triangular castings will be slowly rotated and the various arms connecting the corners of said castings to the shafts upon which the compression-rollers are located and to the shafts at the corners of the end frames will move in proper relation to said compression-rollers. The triangular castings may be otherwise described as "oscillating center blocks," and the connections between said center blocks and rollers, as just described, have the further effect of maintaining a constant angle between the center of any two rollers and the center of the oscillating block in each and every position of said rollers. During the time the bale is forming and increasing in diameter said bale will be rotating between the compression-rollers and the end disks and the pressure exerted by said compression-rollers will very tightly and densely pack or roll the cotton or other product that is being baled. When the bale has reached a certain diameter and it has been suitably covered and bound, the operator grasps the horizontal portion of the U-shaped trip-lever 33 and throws the same upwardly. This movement will cause the pins 36 in the heads of said lever to move into the slots 32, and this movement will also allow the shaft 26 to pass into said slots. Said pins and shaft will now pass along through the slots 32 and carry the compression-roller located upon said shaft 26 into the position as indicated by dotted lines in Fig. 5. The pressure exerted by the two remaining compression-rollers will throw the completed and bound bale out from between the disks 17 and from the compress, and when said bale is so discharged the three compression-rollers will reassume their normal positions, which are as indicated by solid lines in Fig. 4. Should, however, the operator fail to throw the trip-lever upwardly at the proper time, the outwardly-turned ends of the arms 34^a will engage against the lugs 33^a on the end frames, and the compression-roller on the shaft 26 will thus be automatically allowed to move outwardly in order to discharge the bale.

A roller-compress of my improved construction allows the bale that is being formed to always occupy the same horizontal plane, and said bale receives pressure at three points on its periphery, thereby allowing said bale to be compressed to a greater density than by any of the other forms of roller-compresses now in use.

The triangular castings are so arranged that when starting a bale the lever-arms upon which the weight is hung are very short, but increase in length slowly as the bale enlarges in diameter. This arrangement allows the weight on the arms to cause the compression-rollers to exert an increasing pressure as the bale grows in diameter, the effect of which will be to pack or roll the bale much tighter and more densely at the outside than at the inside, which is a very desirable feature, as a bale so formed will unwind much easier and quicker than will bales packed with equal pressure throughout.

By using a collapsible core there is nothing left in the bale that would increase the cost or weight of said bale, and the fibers in the center of a bale are not injured in drawing out a core after the bale is finished.

A roller-compress constructed in accordance with the foregoing description can be very advantageously used in connection with the ordinary cotton-gin, requires the attention of but a single operator, is compact, composed of a minimum number of parts, and possesses superior advantages in point of simplicity, durability, and general efficiency.

What I claim is—

1. In a cotton-press for making cylindrical bales, the combination with a plurality of baling-rolls mounted so as to separate with the enlarging bale, of a pressure device common to all of said rolls for resisting the tendency of the same to separate and means independent of said pressure device for driving said rolls, substantially as described.

2. In a baling-press for making cylindrical bales, the combination with a plurality of compression-surfaces between which the bale is formed, of means for supporting them in contact with the bale and imparting motion to said surfaces, and a means common to all of said surfaces and independent of the driving mechanism, whereby pressure is applied to said surfaces, substantially as described.

3. In a baling-press for making cylindrical bales, the combination with a plurality of

compression-surfaces between which the bale is formed, of fixed centers, said surfaces mounted so as to recede with the enlarging of the bale, and at the same time remain in rigid connection with said fixed centers, means of supporting said fixed centers, means for imparting motion to said surfaces and means for exerting pressure on said surfaces, substantially as described.

4. In a baling-press for the formation of cylindrical bales, the combination with a series of compressing-rollers adapted to bear upon the surface of a bale during the formation thereof, means to operate said rollers, and swinging supports for two or more of said rollers connecting said rollers and the frame of the press, whereby the rollers so supported and swung are permitted to gradually recede from the bale during the formation thereof, substantially as described.

5. In a baling-press for the formation of cylindrical bales, the combination with a series of compressing-rollers adapted to bear upon the surface of a bale during the formation thereof, means to operate said rollers, means to support them in contact with the bale, a journal mounted in the framing and alining with the longitudinal axis of the bale during its formation, means connecting said rollers and journal, and means connected to said journal for controlling the motion of the same, and thereby regulating the pressure of said rollers against the continually-increasing bale, substantially as described.

6. In a baling-press, compress-rollers and shafts arranged substantially as shown, supports for said rollers and means for operating the same, in combination with an oscillating center block, suitable connections between said center block and rollers permitting a gradual recession of the rollers, whereby a constant angle is maintained between the center of any two rollers and the center of the oscillating block, in each and every position of said rollers, substantially as described.

7. The combination with the compression-rollers and supports for said rollers, of the oscillating center block to which said rollers are connected, and end disks adapted to rotate, between which rollers and disks the bale is compressed, substantially as described.

8. In a baling-press for the formation of cylindrical bales, a series of compressing-rollers adapted to bear upon the surface of a bale during the formation thereof, in combination with means to operate said rollers and means to support them in contact with the bale, said supports adapted to hold two of said rollers directly above the third roller, the upper rollers separated to permit the material forming the bale to be fed between them at the top and to fall upon said lower roller, arms carrying the axis of one of said upper rollers and means for moving said roller-axis outwardly on said arms, whereby the formation of the bale and its discharge are facilitated, substantially as described.

9. A roller-compress, comprising a pair of triangular end frames, shafts journaled in said end frames at the apices and lower ends thereof, gear-wheels mounted upon the ends of said shafts, one of which is driven, arms mounted upon said shafts adjacent the end frames, shafts journaled in the ends of said arms and having gear-wheels mounted on their ends to mesh with the hereinbefore-mentioned gear-wheels, compression-rollers located upon said shafts between the end frames, stub-shafts journaled in the centers of the triangular end frames, a gear-wheel mounted upon the outside of one of said stub-shafts and meshing with the first-mentioned set of gear-wheels, triangular castings located upon said stub-shafts inside the triangular end frames, bars pivoted between the corners of said triangular castings and pivoted at their outer ends to the free ends of the hereinbefore-mentioned arms, and disks loosely mounted upon the inner ends of the stub-shafts.

10. In a roller-compress, a pair of triangular end frames, a series of compression-rollers extending and operating between said end frames, rotating disks located at the ends of said compression-rollers, toggle arms or levers connecting the shafts of the compression-rollers and constructed and arranged to cause said rollers to move outwardly in unison and at equal distances relative to one another, and suitable driving mechanism for said compression-rollers.

11. In a roller-compress, a pair of end frames, shafts journaled in said end frames, arms fulcrumed in said shafts, a series of shafts mounted for rotation in the opposite ends of said arms, compression-rollers located upon said shafts, triangular castings mounted for rotation inside the end frames, arms connecting the corners of said castings to the last-mentioned shafts, and a suitable train of gearing for operating said shafts and compression-rollers.

12. In a roller-compress, a pair of end frames, triangular castings mounted for rotation inside said end frames, a series of compression-rollers arranged for rotation between said end frames, toggle levers or arms connected to the journal-shafts of said rollers and arranged to permit the latter to swing relative to one another, and a suitable train of gearing for said compression-rollers, one pair of the toggle arms or levers being slotted to allow one of the compression-rollers to move outwardly to discharge the completed bale.

13. In a roller-compress, a pair of end frames, triangular castings adjacent said frames, compression-rollers arranged to operate between said end frames, toggle levers or arms connecting said compression-rollers to the end frame to cause the same to swing outwardly relative to one another and said toggle-levers connected to said triangular castings, disks located for rotation adjacent the end frames and at the ends of the compressing-rollers,

a train of gearing for properly operating said compression-rollers, one pair of the toggle levers or arms being slotted to allow one of the compression-rollers to move outwardly while the completed bale is discharging, and a trip device for normally holding the shaft of this outwardly-moving compression-roller in proper position while the bale is being formed.

14. In a roller-compress, a pair of end frames, compression-rollers mounted for rotation between said end frames, disks mounted for rotation at the ends of said compression-rollers, triangular castings mounted on the shafts of said disks, a suitable train of gearing for operating said compression-rollers, toggle levers or arms connecting the shafts of the compression-rollers to the corners of the triangular castings and the end frames to allow said compression-rollers to move at proper distances relative to one another, one pair of said toggle levers or arms being slotted to allow one of the compression-rollers to swing outwardly while the completed bale is discharging, and suitable arms fixed to and depending from the triangular castings, to which arms is adapted to be applied proper weight or pressure.

15. In a roller-compress, a series of compression-rollers suitably driven and located at triangular points relative to one another, suitable toggle-arms, means constructed to allow said compression-rollers to swing outwardly at equal distances relative to one another, weight-carrying arms swung from a pair of said toggle-arms, a pair of said toggle-arms being slotted to allow one of the compression-rollers to move outwardly when the bale is finished, and levers arranged to automatically trip when the bale has reached a certain diameter.

16. In a roller-compress, a series of compression-rollers arranged to swing outwardly at equal distances relative to one another, swinging arms upon which said rollers are mounted, one pair of said arms being slotted in order to allow one of said rollers to move outwardly when the bale is being discharged, and trip-levers for holding the outwardly-moving roller in position while the bale is being formed and to trip while said bale is being discharged.

17. In a roller-compress, a series of compression-rollers arranged at triangular points relative to one another, a trip device and means connecting said trip device to said rollers and constructed to permit one of said rollers to move outwardly and upwardly when the bale has reached a certain diameter.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN R. FORDYCE.

Witnesses:
EDWARD E. LONGAN,
JOHN C. HIGDON.