No. 715,338. Patented Dec. 9, 1902.

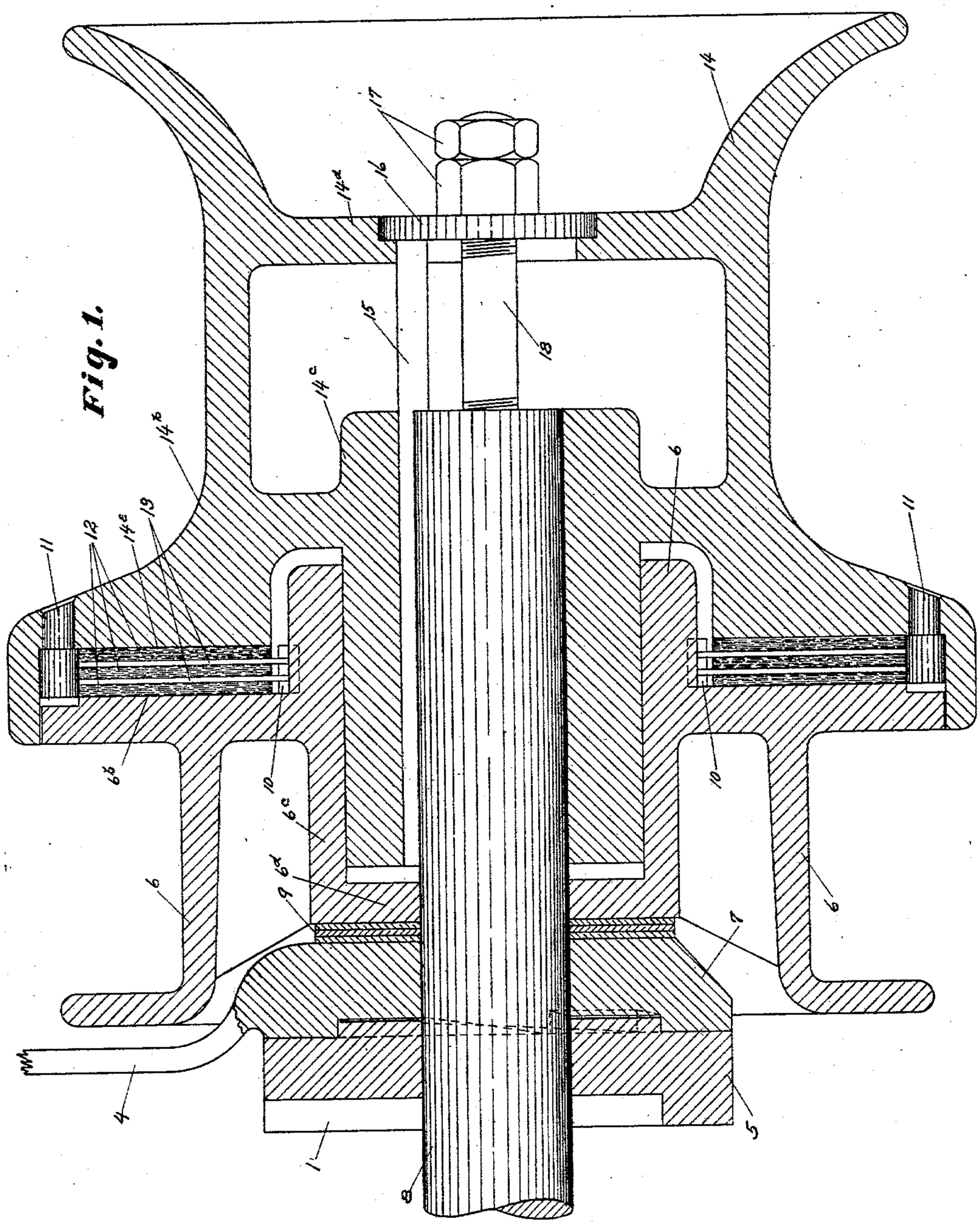
C. A. BAECHTOLD & H. N. COVELL.

ROPE OPERATING APPARATUS.

(Application filed May 26, 1899.)

(No Model.) 5 Sheets—Sheet 1.

Fig. 1.



WITNESSES
Freda Kempter
Charles J. Rathjen

INVENTORS
Charles A. Baechtold
Harry N. Covell
by Gifford & Bull
ATTORNEYS.

No. 715,338. Patented Dec. 9, 1902.

C. A. BAECHTOLD & H. N. COVELL.

ROPE OPERATING APPARATUS.

(Application filed May 26, 1899.)

(No Model.) 5 Sheets—Sheet 2.

Fig. 2.

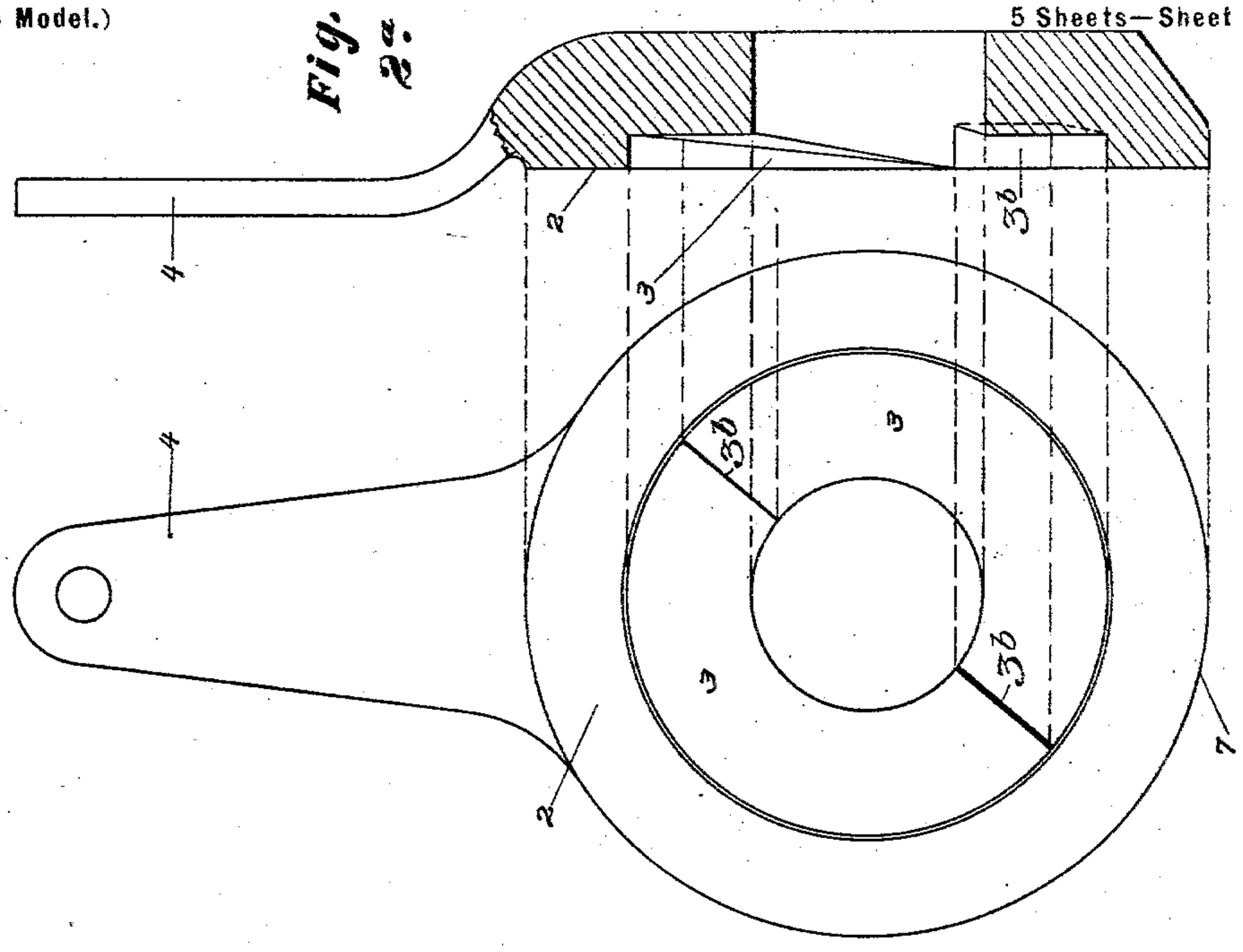


Fig. 3a.

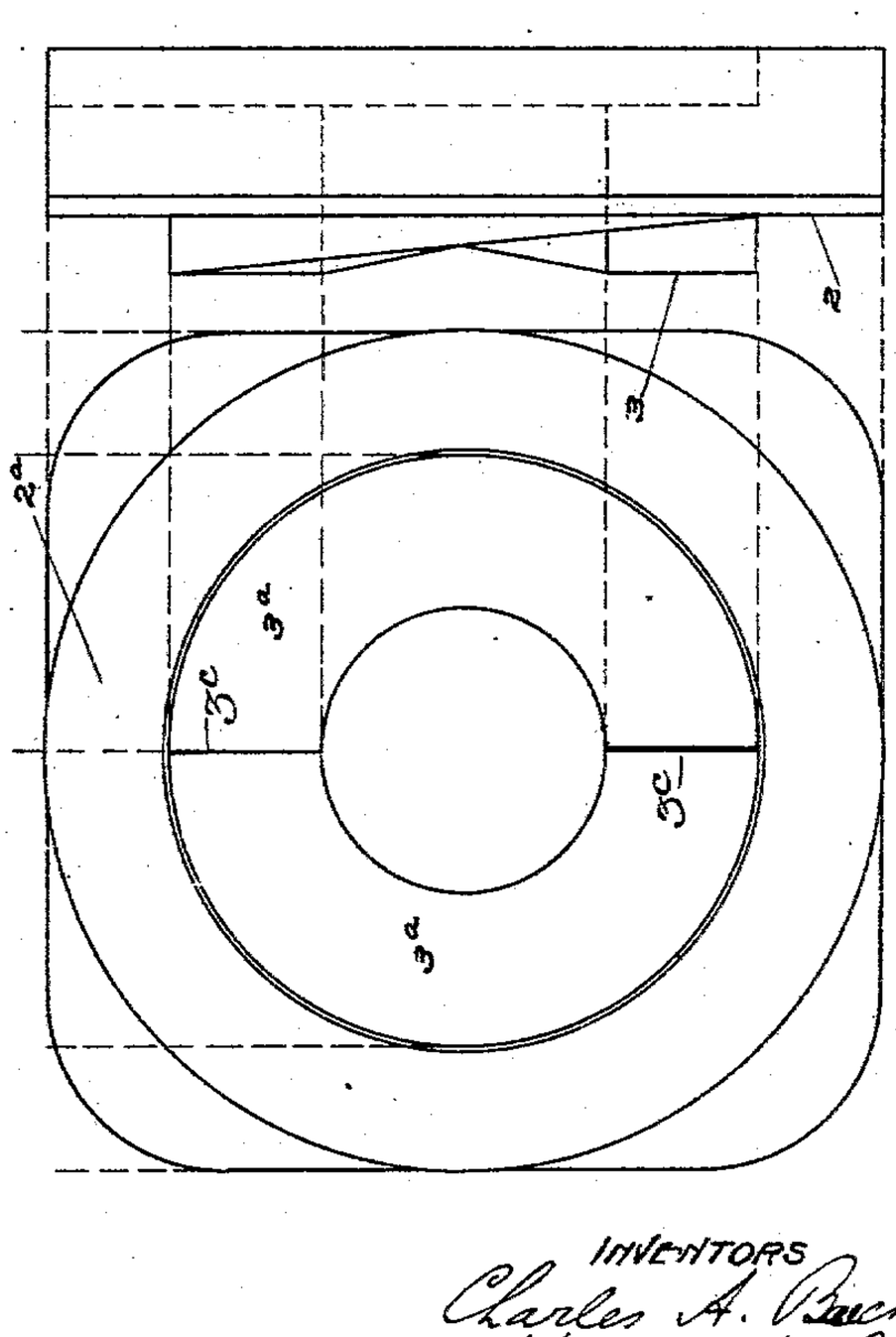


Fig. 3.

WITNESSES
Fred. Kemper
Charles J. Rathjen

INVENTORS
Charles A. Baechtold
Harry N. Covell
by Gifford & Beall
ATTORNEYS.

No. 715,338. Patented Dec. 9, 1902.

C. A. BAECHTOLD & H. N. COVELL.

ROPE OPERATING APPARATUS.

(Application filed May 26, 1899.)

(No Model.) 5 Sheets—Sheet 3

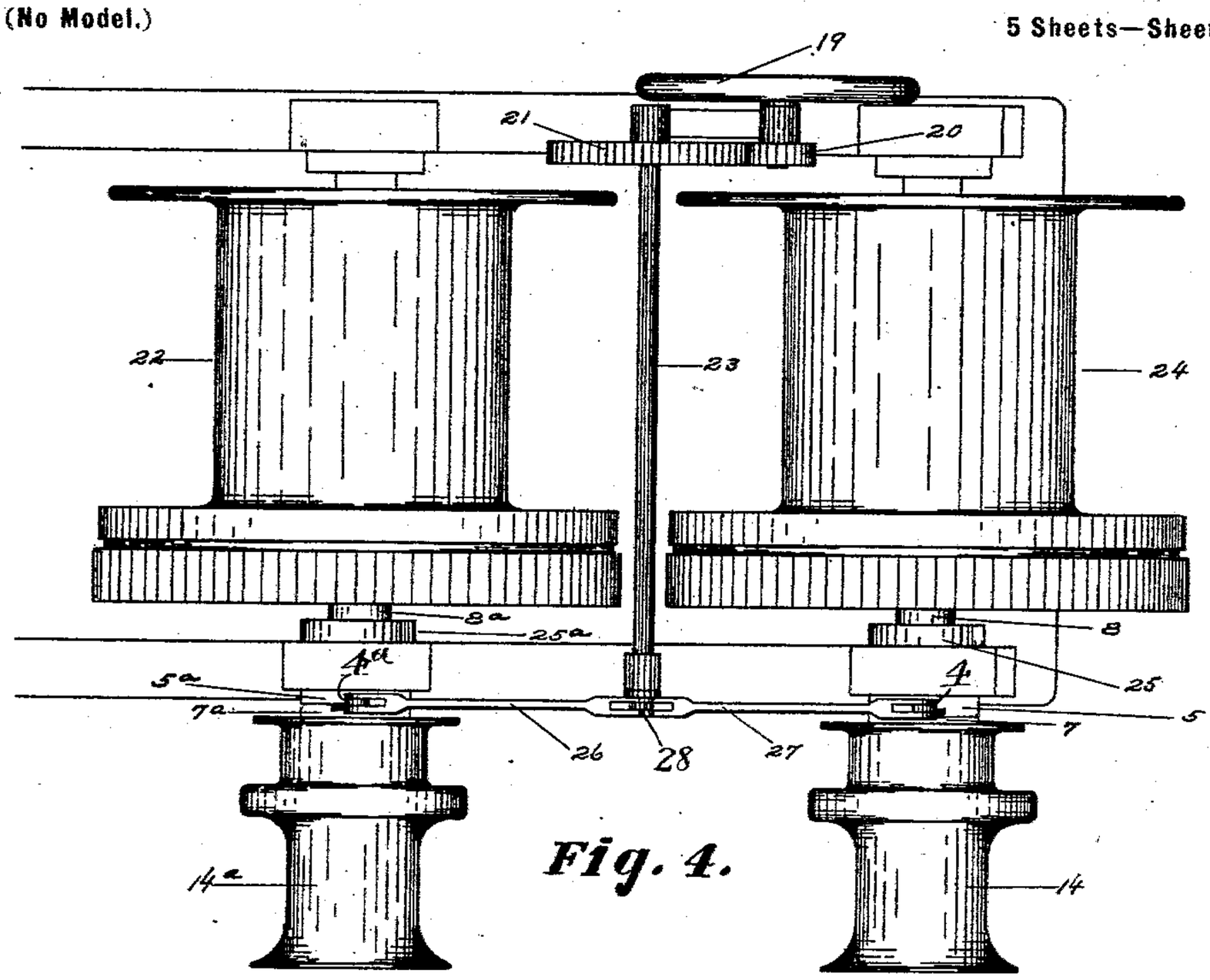


Fig. 4.

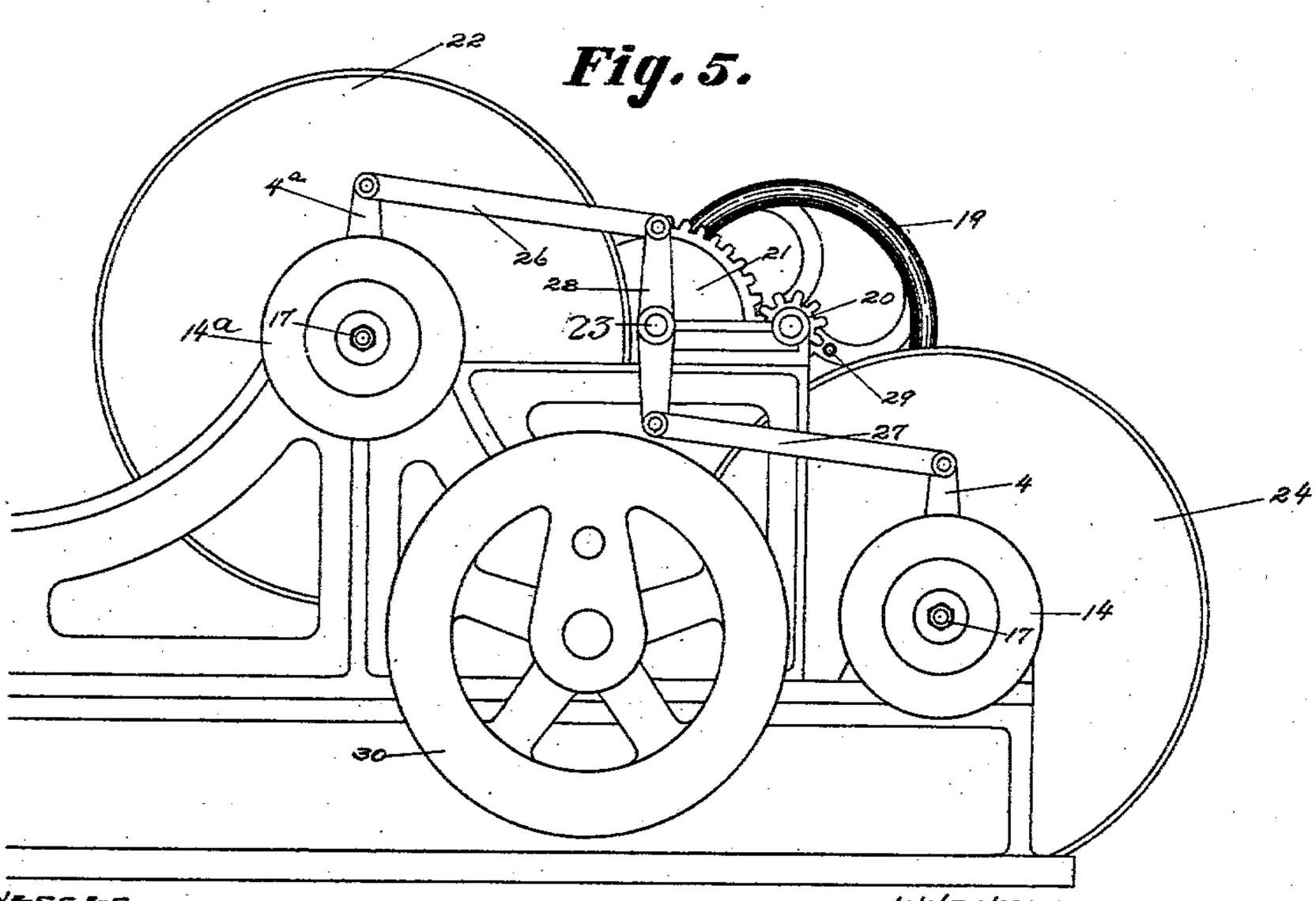


Fig. 5.

WITNESSES
Fred'k Kempner
Charles J. Rathjen

INVENTORS
Charles A. Baechtold
Harry N. Covell
by Gifford & Bull.
ATTORNEYS

No. 715,338. Patented Dec. 9, 1902.

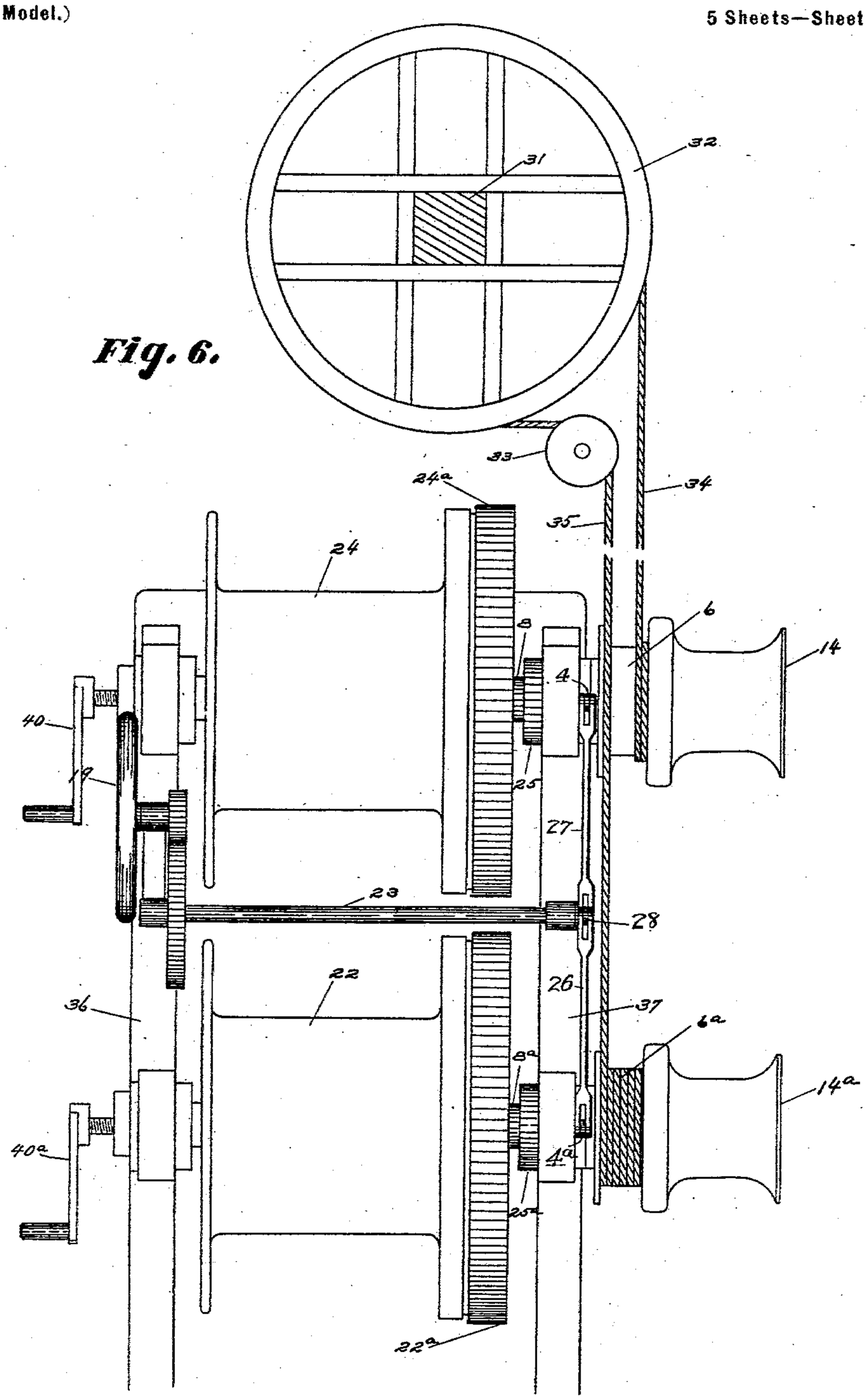
C. A. BAECHTOLD & H. N. COVELL.

ROPE OPERATING APPARATUS.

(Application filed May 26, 1899.)

(No Model.) 5 Sheets—Sheet 4.

Fig. 6.



WITNESSES
Fred. Kemper
Charles J. Rathjen

INVENTORS
Charles A. Baechtold
Harry N. Covell
by Gifford & Bull.
ATTORNEYS.

No. 715,338. Patented Dec. 9, 1902.

C. A. BAECHTOLD & H. N. COVELL.

ROPE OPERATING APPARATUS.

(Application filed May 26, 1899.)

(No Model.) 5 Sheets—Sheet 5.

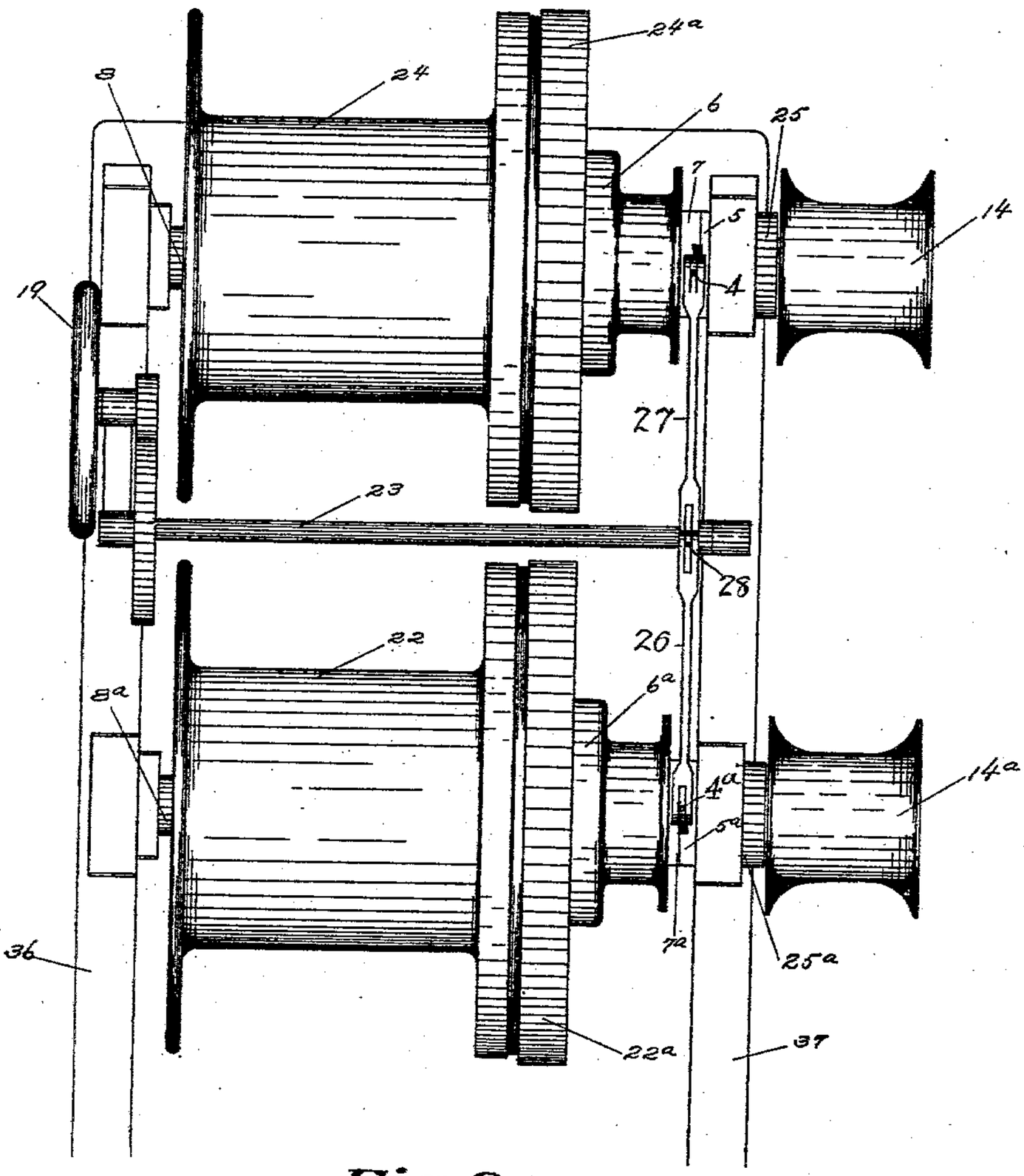


Fig. 8.

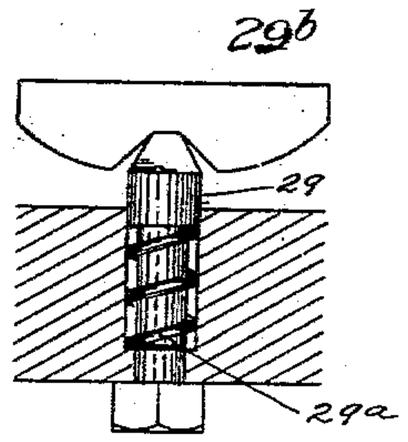


Fig. 7.

WITNESSES
Fred. Exemper
Charles J. Rathjen

INVENTORS
Charles A. Baechtold
Harry N. Covell
by Lyford & Bull.
ATTORNEYS.

UNITED STATES PATENT OFFICE.

CHARLES A. BAECHTOLD AND HARRY N. COVELL, OF BROOKLYN, NEW YORK, ASSIGNORS TO THE LIDGERWOOD MANUFACTURING COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ROPE-OPERATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 715,338, dated December 9, 1902.

Application filed May 26, 1899. Serial No. 718,385. (No model.)

To all whom it may concern:

Be it known that we, CHARLES A. BAECHTOLD and HARRY N. COVELL, citizens of the United States, and residents of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Rope-Operating Apparatus, of which the following is a specification.

The principal object of our invention is to provide an improved swinging gear for a derrick-engine.

In the accompanying drawings, Figure 1 is a longitudinal section of a winch-head and swinging drum. Fig. 2 is a face view of one of the operating cam members detached. Fig. 2ª is a section of the same on the same plane as in Fig. 1. Fig. 3 is a face view of the other cam member. Fig. 3ª is an edge elevation of the same. Fig. 4 is a plan of the engine, showing our device attached. Fig. 5 is an elevation of the same. Fig. 6 is a plan of the engine combined as in use with the bull-wheel of a swinging-boom derrick, of which the rope connected with the drums 6 and 6ª serves to swing the boom and ropes connected with the drums 22 and 24, respectively, serve to hoist and lower the boom and the load. Fig. 7 is a detail of the pin 29 and its socket. Fig. 8 is a plan view of an apparatus containing a modified form of our invention.

Our invention is designed to be attached to or made as a part of an engine such as used for operating derricks, such engines usually having two drums, as the drums 22 and 24, one for the hoisting-rope and the other for the boom-fall rope, by which the boom is raised and lowered.

Our device may be made to operate upon a bull-wheel secured to the derrick-mast, or the ropes may be lead from the drums through suitable guiding-pulleys to the boom itself. The latter construction will not, however, permit as large an angle of swing as where a bull-wheel is used.

31 is the derrick-mast. 32 is a bull-wheel fast to the same.

34 35 represent a rope which passes around the bull-wheel for swinging the boom.

33 is a sheave around which the branch 35 of the rope passes.

6 and 6ª are drums upon which the rope ends 34 and 35 are respectively coiled.

14 and 14ª are winch-heads.

8 and 8ª are shafts driven by the spur-wheels 24ª and 22ª, fast on said shafts, respectively. 24 and 22 are ordinary friction-drums loose on said shafts and forming a friction connection with friction-surfaces fast on said spur-wheels. The drum 22 operates the rope by which the boom of the derrick is raised and lowered, and the drum 24 operates the rope by which the load is raised and lowered.

36 and 37 are the frames in which the shafts 8 and 8ª have their bearings and between which the drums 22 and 24 and the spur-wheels 22ª and 24ª are located. The shafts 8 and 8ª project through and beyond the bearings in the frame 37, and upon them are located the winch-heads 14 and 14ª and the supplemental drums 6 and 6ª, preferably outside the frame 37.

Each of the winch-heads is constructed as shown in Fig. 1 and contains the winch-surface 14ᵇ, the bearing 14ᶜ, keyed to the shaft by the key 15, also the inward-projecting flange 14ᵈ, against which bears a collar 16, connected with the end of the shaft by the bolt 18, carrying the jam-nuts 17, so that the position of the winch-head on the shaft may be adjusted longitudinally of the shaft to provide for the wear of the clutch-plates.

6ᶜ is a sleeve integral with the supplemental drum 6 and forming the bearing for the same on the outside of the sleeve 14ᶜ of the winch-head. The sleeve 6ᶜ extends inside of the friction-disks 12 and 13 and of the friction-surface 14ᵉ and also extends so as to underlie the rope-surface of the supplemental drum 6. It is provided with an inwardly-extending flange 6ᵈ, which extends inwardly, so as to bear against the shaft at the end of the sleeve 14ᶜ. The end surface of the flange 6ᵈ constitutes an end-bearing surface for the anti-friction steel washers 9. The cam members 5 and 7 are interposed between the frame 37 and the antifriction-washers 9, so as to pro-

duce frictional engagement between the friction-disks attached to the supplemental drum 6 and the winch-head.

25 and 25ª are collars fixed on the shafts 8 and 8ª behind the frame 37, so that the end thrust is thrown upon the shaft 8 between the collars 16 and 25 and upon shaft 8ª between the corresponding collars thereon.

The novel form of contact-surfaces between the cam members 5 and 7 may be described as follows: The surfaces 2 and 2ª, which contact with each other, are plane surfaces forming limiting-stops, so that when they are in contact the jam-nuts 17 may be so adjusted that there is sufficient pressure exerted upon the fibrous disks 12 to maintain a minimum amount of friction sufficient to prevent either of the supplemental drums 6 or 6ª from overrunning when paying out its rope. The surfaces 3 and 3ª, which contact with each other and which are located concentrically inside of the surfaces 2 and 2ª, are cam-surfaces adapted to spread the cam members 5 and 7 apart when the cam member 7 is rotated in the proper direction upon the shaft.

4 and 4ª are arms fixed to the two cam members 7, respectively, which arms are respectively connected with opposite ends of the rocker 28 by the links 27 and 26. The rocker 28 is fixed upon the rock-shaft 23, that extends across the machine, and may be operated by a lever directly or through the gears 21 and 20 and the hand-wheel 19. The rock-shaft enables the operating wheels or levers to be located in a convenient position to be operated by the attendant standing on the same side of the machine as that on which he stands for the operation of the friction-drums 22 and 24.

29 is a pin projected by a spring 29ª, which passes through any convenient member, either movable or stationary, adjacent another member which has relative movement thereto, said other member having a notched projection 29ᵇ, engaged by the pin when the two are brought into register, which will occur when the cams are in neutral or central position. These two members may be the frame and the wheel 21 or the frame and the lever-arm 4. The conical point of this pin enters the socket, as shown in Fig. 7, so as to indicate to the operator the position of the wheel, which corresponds with the neutral position of the two pairs of cam members. The sloping contact-surfaces between the pin and the notch enables the pin to readily ride out of the notch when the wheel is engaged by the operator, but furnishes sufficient resistance to prevent accidental displacement.

30 is the crank-wheel by which the power is received for driving the apparatus and from which, as usual, the power is transmitted to the spur-wheels 24ª and 22ª, so as to drive the shafts 8 and 8ª in the same direction with each other.

Within a recess in the inner end of the winch-head 14 are placed friction or clutch disks 12 and 13, the disks 12 being secured to turn with the winch-head by means of bolts or studs 11 and the plates 13 being secured to turn with the swinging drum 6 by means of keys 10 or other suitable devices. The two sets of disks alternate or intermesh, so that when pressed between the surfaces 6ᵇ and 14ᵉ they act to cause the winch-head and swinging drum to turn together. The amount of power thus exerted to turn the swinging drum depends upon the pressure applied to the disks. These disks may be made of metal, fiber, leather, or any suitable material.

The operation of the apparatus is as follows: The shafts 8 and 8ª are continuously driven in the same direction, the attendant standing at one side of the apparatus and by the operation of the friction-drums 22 and 24 controls the elevation of the boom and the lifting of the load in a manner well known. When the hand-wheel 19 is in the position so that the pin 29 engages with its notch, the surfaces 2 and 2ª will be in contact between the cam members on both shafts, and the friction exerted by the disks 12 on both shafts being at its minimum and substantially equal will not rotate either the supplemental drum 6 or the supplemental drum 6ª, and the bull-wheel will remain stationary. We have discovered that by using the friction-disks 12 with the interposed disks 13 we may maintain a sufficient minimum pressure to prevent the supplemental drums 6 and 6ª from overrunning under any conditions, and yet the said friction-surfaces may under such minimum friction slip upon each other continuously while the cam members are in their neutral positions without substantially impairing the success of the apparatus through wear, this having heretofore been supposed to be an impossibility from experience with other apparatus for a similar purpose. In the neutral position the cam-surfaces 3 and 3ª are substantially in contact; but the shoulders 3ᵇ and 3ᶜ are separated, so as to permit sufficient movement of the head 7 to set the clutch in operation without being themselves brought into contact. The cam-surfaces of one set are therefore separated when those of the other set are brought into action to set the clutch. When now the operator desires to swing the boom in either direction, he turns the hand-wheel 19, and thereby turns both cam members 7. Since, however, the cam members are respectively connected with opposite ends of the rocker 28, they turn in opposite directions, and thereby the cam-surfaces 3 and 3ª on one shaft are thrown into operation, while on the other shaft the corresponding cam-surfaces are separated, the contact-surfaces 2 and 2ª remaining in contact, furnishing sufficient power to the clutch to prevent its end of the rope running out too fast. Thus one of the supplemental drums winds in on the bull-wheel rope and the other pays out; but the one that pays out is still under sufficient friction, owing to the

pressure still exerted between the contact-surfaces 2 and 2^a to prevent it from overrunning. If the operator desires to swing the boom in the opposite direction, he turns the hand-wheel 19 in the opposite direction, and the same action above described takes place inversely.

We have discovered that by having the contact-surfaces between the cam members on the shaft 8 a duplicate of those on the shaft 8^a—that is to say, both of them right hand or both of them left hand—and having them respectively connected with opposite ends of a rocker 28 they may be operated smoothly and readily from the same hand-wheel 19, nothwithstanding the fact that both of the shafts 8 and 8^a revolve in the same direction, it having heretofore been supposed to be impossible to obtain such smooth operation by reason of the tendency of the rotation of the shafts to assist the throwing of the cam member in one direction and resist the throwing of it in the opposite direction to such an extent as to render it impossible for the operator to control the apparatus with that degree of precision and promptness which are desirable for successful and safe operation. By reason of the above manner of connecting the cam members this tendency upon one shaft is opposite to and neutralized by the same tendency upon the other shaft.

In the modification shown in Fig 8 the supplemental friction-drums 6 and 6^a and their operating mechanism are transferred from the outside of the frame to a position between the respective spur-wheels 24^a and 22^a and the frame 37. The collars 25 and 25^a are transferred to a position outside of the frame, and the friction-surfaces with which the drums 6 and 6^a engage are transferred from the faces of the winch-heads 14 and 14^a to the faces of the spur-wheels 24^a and 22^a. In this modified form of construction the pressures of the friction-surfaces on the drum 24 and the drum 6 act inversely upon friction-surfaces carried by the spur-wheel 24^a, and the pressures of the friction-surfaces on drum 22 and drum 6^a act inversely upon friction-surfaces carried by the spur-wheel 22^a. The mechanism by which the friction-surfaces on the drums 24 and 22 are shoved against the friction-surfaces on the spur-wheels 24^a and 22^a is well known, and one form is shown at 40 and 40^a in Fig. 6.

We claim—

1. In a derrick-engine, in combination, the shafts 8 and 8^a, a winding-drum and a supplemental drum upon each of said shafts, a friction mechanism connected with each of said supplemental drums, and cam members; each of said cam members containing a plane surface and a cam-surface, and means of adjustment whereby the minimum of friction may be regulated when said plane surfaces are in contact.

2. In combination a shaft, a member fast to the shaft, a rope-drum loose on the shaft, friction mechanism interposed between said drum and said shaft-carried member, a cam member fixed against longitudinal movement and a coöperating cam member interposed between said fixed cam member and said drum, and means of longitudinal adjustment between said fixed cam member and said shaft-carried member, the contact-surfaces of each of said cam members consisting of a plane or inactive portion whereby a constant minimum of friction is maintained, and a cam portion whereby the friction may be increased.

3. In a derrick-engine the combination of two shafts, each shaft having thereon a friction-operated drum, a winch-head secured to turn therewith, a supplemental drum free to turn upon the shaft, and a friction device for turning said supplemental drum from the shaft, with operating means for said friction mechanisms each consisting of a stationary and a movable member having plane and cam surfaces adapted to engage to actuate the friction mechanisms to turn the supplemental drums oppositely.

4. In combination, the shaft 8, the winch-head 14 keyed to said shaft, the rope-drum 6 loose on said shaft, a hard-rubber fiber disk interposed between said winch-head and said rope-drum and secured to the face of one and bearing upon the other, and the cam members 5 and 7 whereby said rope-drum is thrust toward said winch-head.

5. In combination, the shaft 8, the winch-head containing the sleeve 14^c keyed to said shaft, the rope-drum containing the sleeve 6^c journaled upon said sleeve 14^c and containing the end bearing 6^d extending inwardly at the end of said sleeve 14^c and cam members 5 and 7 whereby thrust is exerted on said bearing 6^d.

6. In a windlass-engine, in combination, the hand-wheel 19, the rock-shaft 23 geared thereto, the rocker 28, the cam members 7 and 7^a mounted respectively on the shafts 8 and 8^a, connections between said cam members respectively, and the opposite ends of said rocker, the supplemental drums 6 and 6^a and friction mechanisms on said drums adapted to connect them with their respective shafts and actuated by said cam members.

7. In combination with a swinging-boom derrick, a load-hoisting drum, a boom-hoisting drum, a supplemental friction-drum for swinging the boom in one direction, a supplemental friction-drum for swinging the boom in the opposite direction, friction operating mechanisms for said supplemental drums each having a neutral and an operative phase of movement and connections to operate said mechanisms oppositely, thereby preventing overrunning of one drum while the other is winding.

8. In combination with a swinging-boom derrick, a load-hoisting drum, a boom-hoisting drum, a supplemental friction-drum, for swinging the boom in one direction, a sup-

plemental friction-drum for swinging the boom in the opposite direction, friction operating mechanisms for said supplemental drums comprising cams having neutral and operative sections and connections between the cams of said mechanisms to bring said sections into action oppositely in each, thereby preventing overrunning of one drum while the other is winding in.

9. In combination, a swinging-boom derrick, a load-hoisting drum, a boom-hoisting drum, a supplemental friction-drum for swinging the boom in one direction, a supplemental friction-drum for swinging the boom in the opposite direction, two shafts each carrying one hoisting-drum and one supplemental drum and the bearings for said shafts, the said hoisting-drums and supplemental drums both being mounted upon said shafts between their bearings.

10. In combination, a swinging-boom derrick, a load-hoisting drum, a boom-hoisting drum, a supplemental friction-drum, for swinging the boom in one direction, a supplemental friction-drum for swinging the boom in the opposite direction, two shafts each carrying one hoisting-drum and one supplemental drum and the bearings for said shafts; the said hoisting-drums and supplemental drums both being mounted upon said shafts between their bearings and a winch-head mounted upon the end of each of said shafts outside of its bearing.

11. The combination in a hoisting-engine, of a rotatable shaft, a thrust member secured thereto, a drum loose upon the shaft and adapted to have friction connection with said thrust member, and operating members movable relative to each other and having plane and cam surfaces adapted to contact each with its kind, and means for adjusting the initial pressure between said operating members.

12. The combination in a hoisting-engine, of a rotatable shaft, a thrust member secured thereto, a drum loose upon the shaft and adapted to have friction connection with said thrust member, friction operating-cams having upon their operating-faces thrust-bearing sections acting as a limiting-stop, and means for adjusting the initial pressure upon said thrust-bearing.

13. The combination in a hoisting-engine, of a rotatable shaft, a thrust member secured thereto, a drum loose upon the shaft, a clutch formed of intermeshing disks connected alternately with the shaft and the drum, a friction operating device comprising cams having upon their operating-faces thrust-bearing sections acting as a limiting-stop, and means for adjusting the initial pressure upon said thrust-bearing.

14. In a hoisting-engine, the combination of two shafts, and means for turning them in the same direction, with thrust members secured to said shafts, drums loosely mounted on the shafts, friction driving connections between said thrust members and drums, means for maintaining a constant minimum pressure upon said friction mechanisms, and means for applying additional pressure to either one of said friction mechanisms at will.

15. The combination with a hoisting-engine, having two rotating shafts, of supplemental drums loose on said shafts, friction driving devices having two parts carried respectively by the said drums and the shafts, adjustable means for maintaining a constant minimum pressure upon said driving devices, and means for applying an additional pressure to either one of said friction driving devices as desired.

16. The combination with a hoisting-engine, having two rotating shafts, of supplemental drums loose on the said shafts, friction driving devices having two parts carried respectively, by the said drums and the shafts, adjustable means for maintaining a constant minimum pressure upon said friction driving devices, cams mounted to turn upon said shafts and adapted to engage said friction driving devices to apply them, a rock-shaft, oppositely-extended arms upon said rock-shaft, and links connecting said arms each with its respective cam.

17. In a boom-swinging or equivalent mechanism, the combination with two drums and independent friction driving mechanisms therefor, of controlling means for each of said friction driving mechanisms each comprising a minimum friction-retaining member, a friction-increasing member and operating connections between the two friction-controlling devices to actuate them oppositely.

CHARLES A. BAECHTOLD.
HARRY N. COVELL.

Witnesses:
FRED S. KEMPER,
CHAS. E. ANDERSON.