

(No Model.)

2 Sheets—Sheet 1.

A. D. PENTZ.
COUNTER SHAFT.

No. 446,138.

Patented Feb. 10, 1891.

Fig. 1.

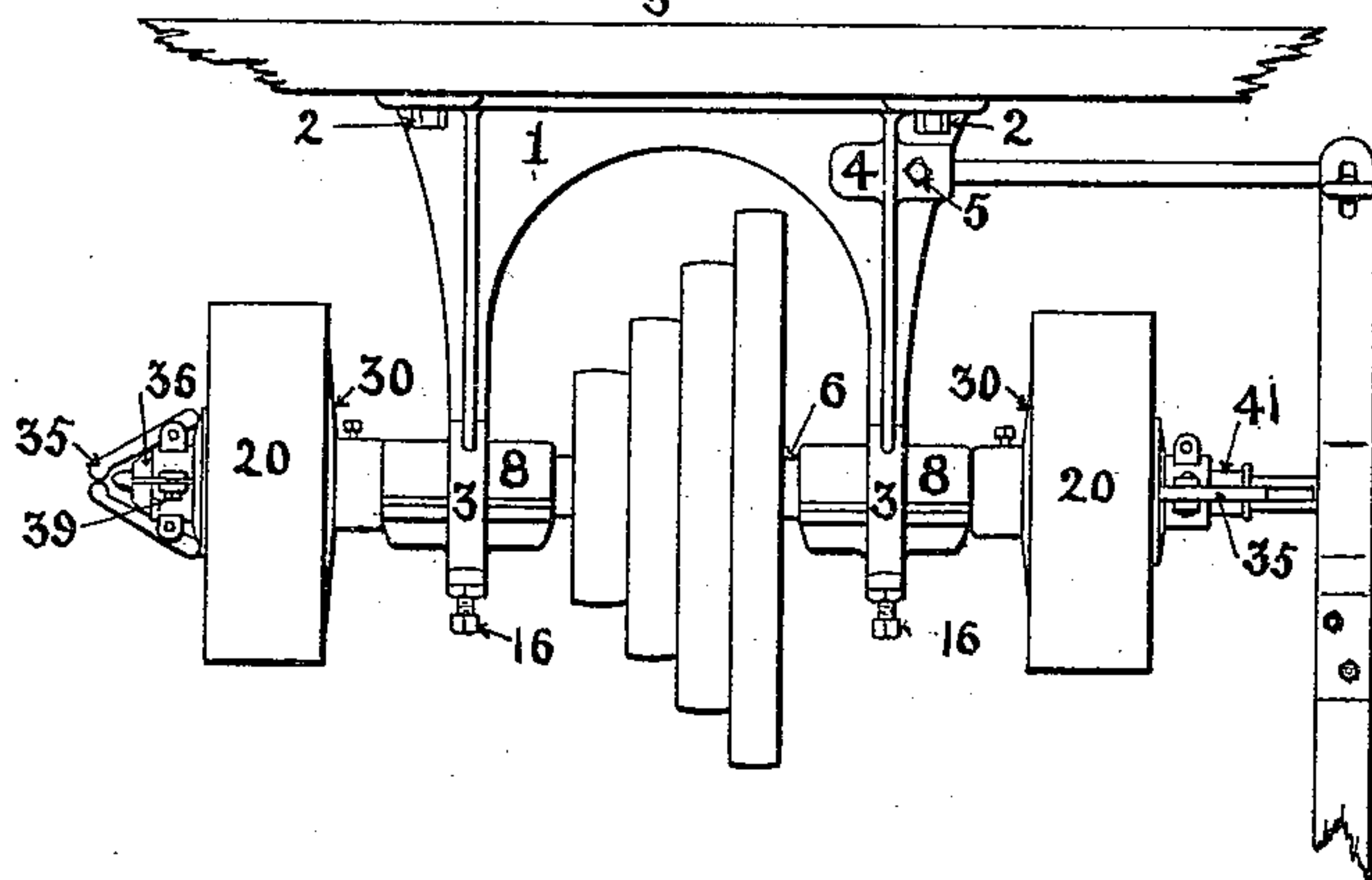
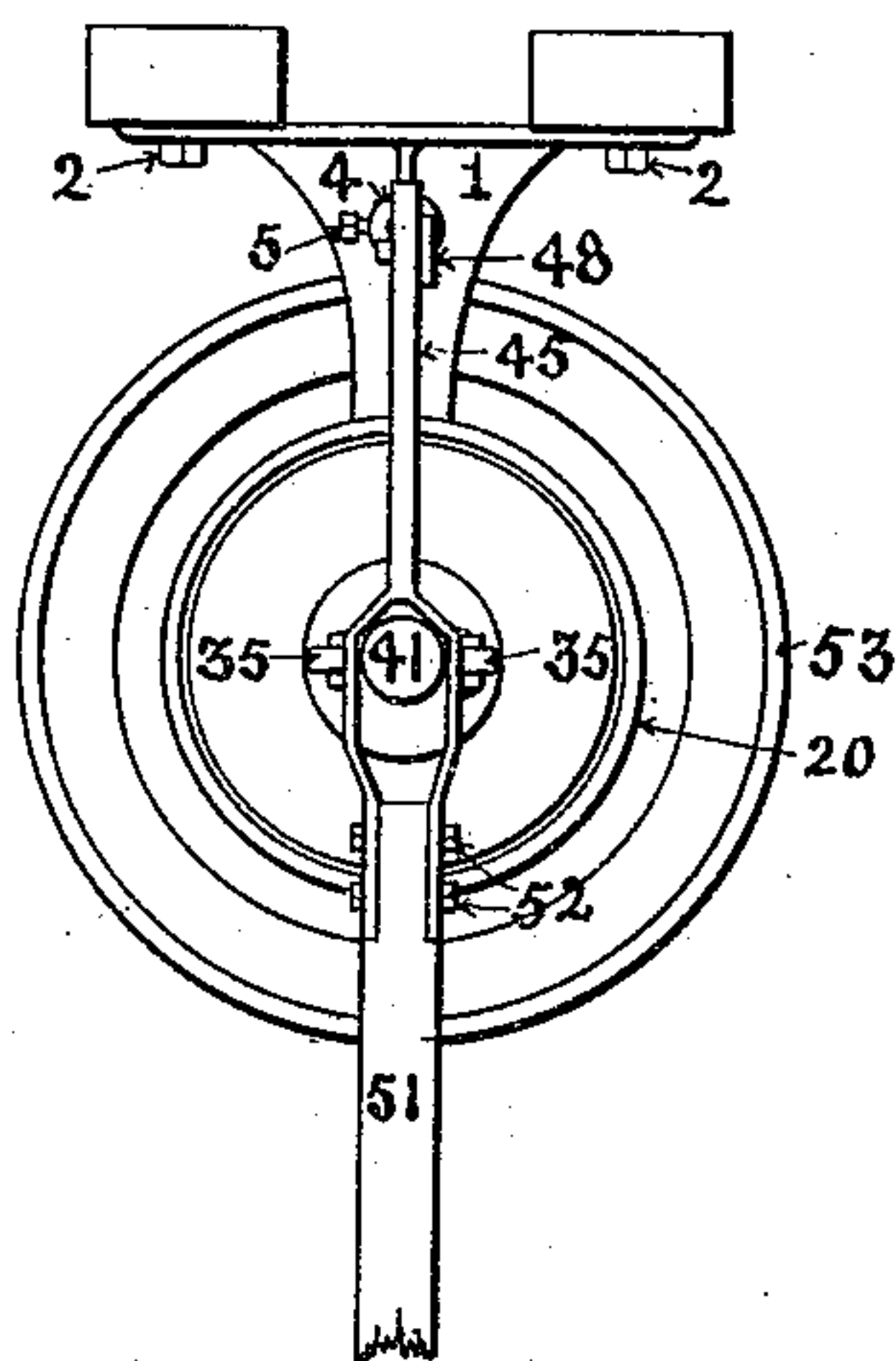


Fig. 2.



Witnesses

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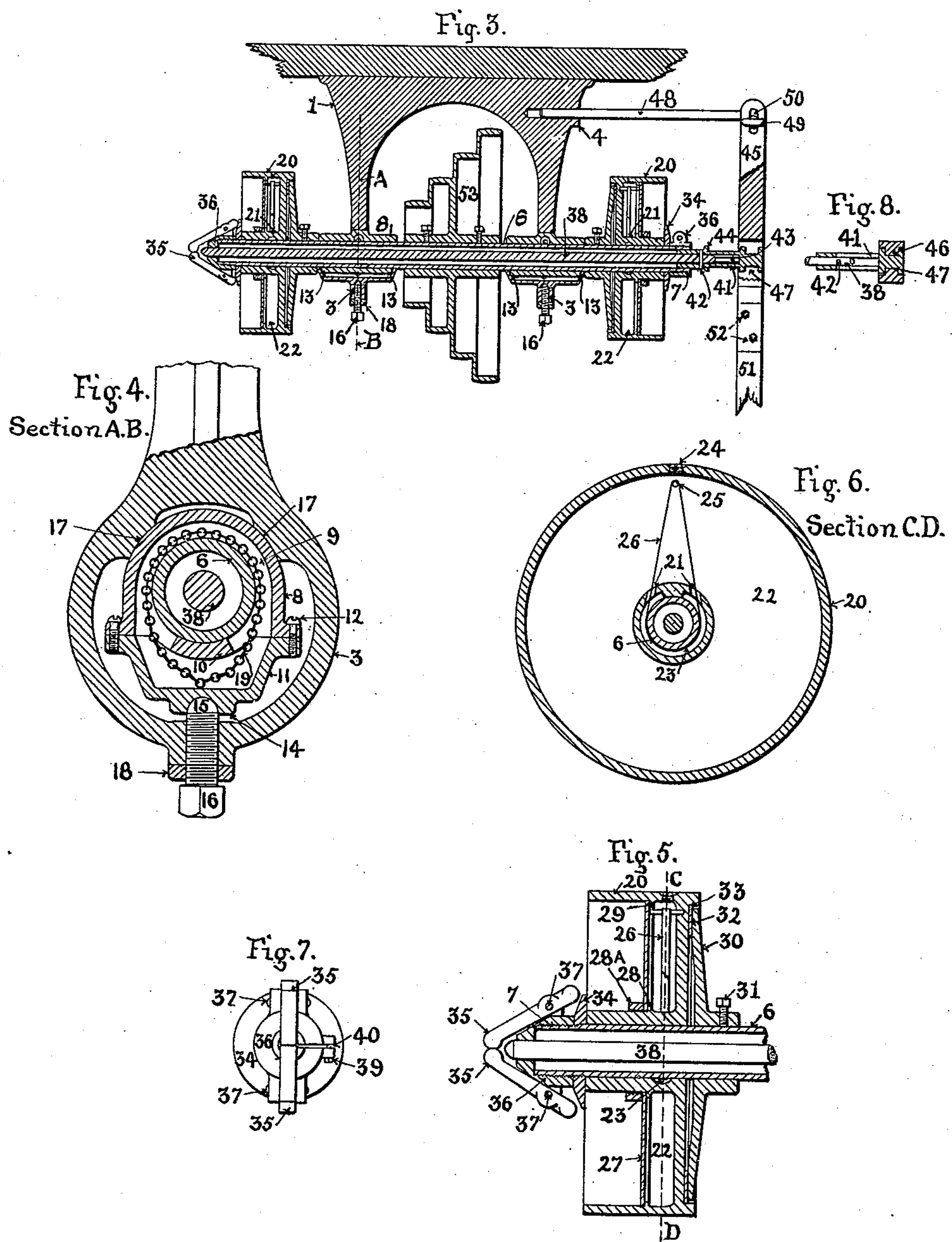
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

ALBERT D. PENTZ, OF ELIZABETH, NEW JERSEY.

COUNTER-SHAFT.

SPECIFICATION forming part of Letters Patent No. 446,138, dated February 10, 1891.

Application filed September 10, 1889. Serial No. 323,505. (No model.)

To all whom it may concern:

Be it known that I, ALBERT D. PENTZ, a citizen of the United States, and a resident of Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Counter-Shafts, of which the following is a specification.

The object of this invention is to improve counter-shafts and similar means of controlling power.

First. By an improved friction-clutch of simple design in which the shipper element is made particularly light in weight and may easily be thrown from one position to the other without the expenditure of much force. This friction, furthermore, clamps the running element to the shaft on friction-surfaces contiguous to the belt-surfaces, and therefore there is the maximum of driving effect attained by the minimum of pressure on such friction-surfaces.

Second. By providing this counter-shaft with self-aligning and self-oiling boxes. In the construction of counter-shafts it is necessary to provide self-aligning boxes to compensate for contortions incident to bolting such counter-shafts to irregular surfaces, such as the ordinary timbers on factory ceilings. Therefore the box is mounted on a hemisphere, to which it is held by opposing cheeks. The self-oiling feature in these boxes is a well-known one.

Third. By attaching all the features necessary to a counter-shaft together for convenience in handling and shipping, for economical manufacture, and for convenience in adjustment.

I have reduced this invention to practice by constructing the mechanisms illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a counter-shaft containing my invention as it is in practice. Fig. 2 is an end elevation of same. Fig. 3 is a vertical longitudinal section cutting the shaft through the center. Fig. 4 is a section on line A B, Fig. 3, cutting the bracket, journal-box, and shaft. Fig. 5 is the left-hand end of Fig. 3, enlarged. Fig. 6 is a section on line C D, Fig. 5, showing details of pulley. Fig. 7 is an elevation of the extreme left hand of Figs. 3 and 5, to show

clutch-levers and collet. Fig. 8 is a horizontal section through the shipper and the extension of the shipper-rod, showing connection.

Like numerals indicate like parts in each view.

The self-oiling pulley indicated in Figs. 3, 5, and 6 and detailed in parts numbered 22 to 29, inclusive, is embraced in a separate application for Letters Patent, dated April 9, 1890, Serial No. 347,263.

The part marked 1 is a bracket or double hanger, made of one casting preferably, and to which all the other elements are here connected.

The parts marked 2 are screws to secure the bracket to the ceiling or wall in the ordinary manner.

The parts marked 3 are loops upon bracket 1 to sustain and control the journal-boxes. These can be made open at one side; but I find that as here constructed less metal has a greater strength.

The part marked 4 is a small hub on bracket 1 to receive the arm for the support of the shipper.

The part marked 5 is a set-screw for the arm that supports the shipper.

The part marked 6 is a shaft, tubular for the reception of the shipper-rod when the friction-clutch has the construction here shown; but it is not necessarily tubular for modified constructions of the friction-clutch. The shaft is here of the same diameter its entire length, and depends on the hubs of the friction-flanges which come against the journal-boxes for end location.

The parts marked 7 are screws cut on the shaft 6 to adjust and secure the clutch-lever collets.

The parts marked 8 are journal-boxes, each here made of one casting, and are further provided with automatic oilers, reservoirs for same, and the hereinafter-described method of securing them in place and alignment.

The parts marked 9 are channels around the sides and upper parts within the boxes 8, giving room for the oiling-chain here used.

The parts marked 10 are bridges terminating the channels 9 under the shaft, serving to distribute oil along the journal and re-

moving excessive oil from the shaft in such a position that such oil is forced to drop back into the reservoir. These bridges are parts of the journal-bearings, and their position
5 gives them value as supports to the shaft, which if the channels 9 were cut entirely around the journal would be lost.

The parts marked 11 are reservoirs secured to the boxes 8 by screws, but which may, if
10 found to be economical, be cast parts of boxes 8.

The parts marked 12 are screws to connect the reservoirs 11 to the boxes 8.

The parts marked 13 are recesses cut in each end of the under sides of the boxes 8 to
15 permit the reservoir 11 to reach up to the shaft, and serving as a trap to catch whatever oil comes through the journal from the channels 9.

The parts marked 14 are bosses added to the thickness of the reservoir 11 to permit the introduction of the hemispherical pivots.

The parts marked 15 are hemispheres attached to the loops 3, in this construction being points of screws. In my experience I
25 have made a number of these solid in the loops 3; but I find it cheaper to furnish screws that are easily machined than to do so much fitting.

The parts marked 16 are screws to support
30 and adjust the hemispheres 15.

The parts marked 17 are cheeks that, in connection with the hemispheres 15, secure the boxes 8 to local position within the loops 3. It is not material that they be distributed
35 as here shown. They may occupy any angle around the shaft that is found best. For instance, the hemispheres 15 may be above the box 8 and the cheeks 17 be beneath the reservoir 11, if desired. The shaft 6, lying within
40 these boxes 8, aligns them automatically, and the boxes are thus securely held on the hemisphere 15 by the combined effects of the cheeks 17 and the shaft 6, but are at the same time free to take the conformity of a shaft that
45 may not be perfectly straight. The boxes 8 could rock in any direction on the point 15 were they not limited by the cheeks 17 to such as are valuable in the alignment of the shaft.

The parts marked 18 are nuts to secure the screws 16 to the loops 3 when necessary.

The parts marked 19 are oil-chains, well known and need no description.

The parts marked 20 are wheels loosely
55 fitted to the shaft 6 and situated when considered as parts of friction-clutches between the friction-flanges and the clutch-levers.

The parts marked 21 are holes pierced through the hub of the pulleys 20 to introduce
60 oil to the bearings.

The parts marked 22 are oil-chambers placed between the rims of the wheels 20 and the shaft upon which they turn.

The parts marked 23 are grooves cut within
65 the bearings of the wheels 20 and terminating on either end between the holes 21.

The parts marked 24 are holes through the

rims of the wheels 20, used to supply oil to the chambers 22 and tightly closed by the screws shown.

The parts marked 25 are pins or similar supports contiguous to the rims of the wheels 20 and within chambers 22.

The parts marked 26 are oil-carriers reaching from around the shaft 6 to the pins 25
75 and around it.

The parts marked 27 are walls of the oil-chamber 22, made of sheets of glass, mica, gelatine, or material that will show through them how much oil there is in the chambers.
80

The parts marked 28 are annular stops on the hubs of the pulleys 20 to locate the wall 27.

The parts marked 29 are annular stops inside the rims of the wheels 20 to locate the
85 other edge of wall 27. It is intended to use a cement or gaskets between the walls 27 and the stops 28 and 29 to insure tightness, and to secure the wall 27 to the stops 28 and 29.

The parts marked 28^A are nuts on the hubs
90 of the pulleys 20 to hold the wall 27 against the stops 28 and 29.

The parts marked 30 are friction-flanges secured to the shaft 6, and having smooth friction-surfaces, here made annular planes,
95 and necessarily not greatly removed from planes.

The parts marked 31 are set-screws that secure the flanges 30 to the shaft 6.

The parts marked 32 are annular cushions
100 between the pulleys 20 and the flanges 30, of elastic material, in this construction paper-board.

The parts marked 33 are suitable surfaces on or recesses in the pulley 20, of a form to
105 exactly oppose the friction-surfaces of the flanges 30, and in the absence of the cushions 32 they may with good results be contact-surfaces for the clutch. It makes no difference whether the pulleys 20 or the flanges
110 30 be rigidly attached to the shaft 6, provided one of them is free to move parallel to the direction of the shaft in obedience to the clutch-levers, and is situated between such levers and the rigidly-attached member.
115

The parts marked 34 are loose flanges, which can be made parts of the pulleys 20, if desired. They are here made coniform to assist the levers.

The parts marked 35 are levers supported
120 on fulcrum within their collets 36, and operating to engage the friction-clutches.

The parts marked 36 are fulcrum-collets having supports and fulcrum for the levers 35, and being adjustably connected on the shaft
125 6 by the screw 7. One of these in this construction is furnished with a guide for the shipper-rod.

The parts marked 37 are the fulcrum of the levers 35. They are here pins supported on
130 both sides of the levers and rigidly attached to their supports.

The part marked 38 is the shipper-rod of the friction-clutches, operating by inclines on

the levers of the friction-clutches, locking them when inserted between, and connected directly to the shipper by a circular groove and studs filling such groove between its walls.

The parts marked 39 are clamp-screws to secure the collets 36 to the screws 7.

The parts marked 40 are slots cutting the collets entirely through on one side, from outside to their shaft-bearings. The screws 39 pass freely through holes in the lugs on one side of these slots, and are fitted to holes tapped in lugs on the other side of these slots. When, therefore, the screws 39 are tightened, they contract the width of these slots 40, reduce the size of the nuts within the collets 36, and rigidly attach them to the shaft 6.

The part marked 41 is an extension of the rod 38, and here is made a separate piece from motives of economy. It is rigidly attached to the rod 38, being bored to receive that rod and pinned to it.

The part marked 42 is a pin fastening the extension 41 to the rod 38.

The part marked 43 is a mortise through the extension 41 to permit the levers 35 to reach their operating-inclines, which inclines are on the right-hand end of the rod 38, which reaches into the mortise, as shown in Fig. 8.

The part marked 44 is a shoulder on the extension 41 to limit the thrust of the rod 38 when forced to the left by coming in contact with the end of the shaft 6. The thrust to the right is here limited by the ends of the mortise 43, contiguous to the pin 42, striking against the inner sides of the levers 35 when the rod is thrust in that direction.

The part marked 45 is a shipper suspended from above. It is connected to the shipper-rod by a slot within an extension of that rod by studs attached to itself. It is clear that the details of this shipper depend largely on the position the rod 38 occupies in relation to the operator, and also upon the conditions in which the friction-clutches operate.

The parts marked 46 are the studs of the shipper 45, that connect it to the shipper-rod. They should fill the space longitudinally between the walls of the slot and be securely attached to the shipper.

The part marked 47 is the slot cut round the extension 41 of the rod 38 and should be concentric to the shaft 6.

The part marked 48 is an arm that suspends the shipper 45 from the bracket 1. It enters the hub 4 and is secured by the set-screw 5. This arrangement permits of the shipper 45 being quickly removed from the bracket 1 whenever the driving-belts on the pulley 20 require adjustment.

The part marked 49 is a T-stud projecting from the arm 48 through the shipper 45, supporting and forming a pivot for the shipper 45.

The part marked 50 is a slot through the shipper 45, arranged to form a lock and pivot for the shipper. The stud 49 is larger in its cylindrical part than it is wide in its arms,

and the slot 50 has a shape that accommodates this peculiarity. Therefore the shipper hangs by two arcs within slot 50 on the cylindrical part of the stud 49.

The part marked 51 is the ordinary wooden extension by which the shipper is operated by hand. The only feature here shown that is not common is the method of clamping it between the two walls of the active shipping element.

The parts marked 52 are bolts or screws to clamp the extension 51 to the shipper.

The part marked 53 is a cone-pulley attached to the shaft by set-screws, and having a position near the middle of the shaft and between the boxes 8.

In operation: The pulleys 20 having ordinary rotary motions on the shaft 6 and the handle 51 being at the disposal of the operator, the shipper 45 may be oscillated on the pivot 49 50. The extension 41 within its slot 47 will receive the motion of the shipper from the studs 46 and communicate such motion to the shipper-rod 38. The levers 35, being forced apart by the entrance of the rod 38, oscillate on their fulcra 37 and press the pulleys 20 into contact with the flanges 30, which flanges, being rigidly attached to the shaft, communicate the motion of the pulley to the shaft and from thence to the cone-pulley. The benefits from the whole counter-shaft being connectedly constructed are that it may be manufactured, adjusted, and shipped from the factory complete and ready to set in place by the parties to use it without trouble.

I claim, substantially as and for the purpose described—

1. The combination of the bracket 1, tubular shaft 6, rod 38 within said shaft, levers which meet and cover the end of said rod, boxes 8, and the described friction-clutch embracing a driven pulley, as 20, the driving-pulley 53, and the shipper, all operating as an intermediate means to receive, control, and deliver power.

2. In combination, in a friction-clutch in which the driving-surfaces are annular planes, a shipper-rod, levers which meet and cover the ends of such shipper-rod when free, and which are forced apart and locked by the introduction of said shipper-rod between them, the bracket 1, the boxes 8, and the shaft 6.

3. The combination of a shaft, as 6, a screw, as 7, a collet, as 36, and a clamp, as 39 40, to secure said collet firmly to the shaft, said parts operating as means to adjust one driving surface of a friction-clutch to the other.

4. The bracket 1, the arm 48, the joint 49 and 50, the shipper 45, and the described friction-clutch mounted between the box 8 and the end of the shaft 6.

5. The combination of the hub 4 on the bracket 1, the screw 5, the arm 48, and the shipper 45, attached to said arm, as set forth.

6. The combination, with a counter-shaft, of a friction-clutch arranged entirely outside the hanger and detachable from the shaft

without disturbing the shaft or boxes, and another similar clutch similarly arranged on the other end of the shaft and outside the other hanger.

5 7. The friction-clutch composed of, first, a hollow shaft containing a rod that has an independent longitudinal motion; second, a wheel loosely fitted to said shaft; third, suitable levers acting on said wheel and pivoted
10 on the shaft at a point where motion received from the said rod will force said wheel to move in a direction parallel to length of the shaft, and, fourth, an annular flange rigidly attached to said shaft in a position to receive
15 the thrust of the wheel on a similar annular flange upon the said wheel.

8. The combination of the rod 38 with suitable guides, the extension 41, having the mortise 43 and the groove 47, the shipper 45, the
20 levers 35, the wheel 20, and the flange 30.

9. The combination of a hollow shaft suitably mounted, a rod occupying its center and suitably arranged to convey motion from a shipper at one end outside the shaft through the entire shaft, operating to attach and de- 25 tach the surfaces of a friction-clutch.

10. A friction-clutch composed of a flange, as 30, attached to the shaft, a pulley, as 20, loose on shaft, having a friction-surface to oppose a similar surface on the said flange 30 and conical surfaces to receive suitable levers, as 35, suitably mounted and adjustable in the direction of the length of the shaft, and a shipper-rod, as 38, operating said clutch-levers by inclines and receiving its motion 35 from a pendent shipper-lever.

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Witnesses:

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