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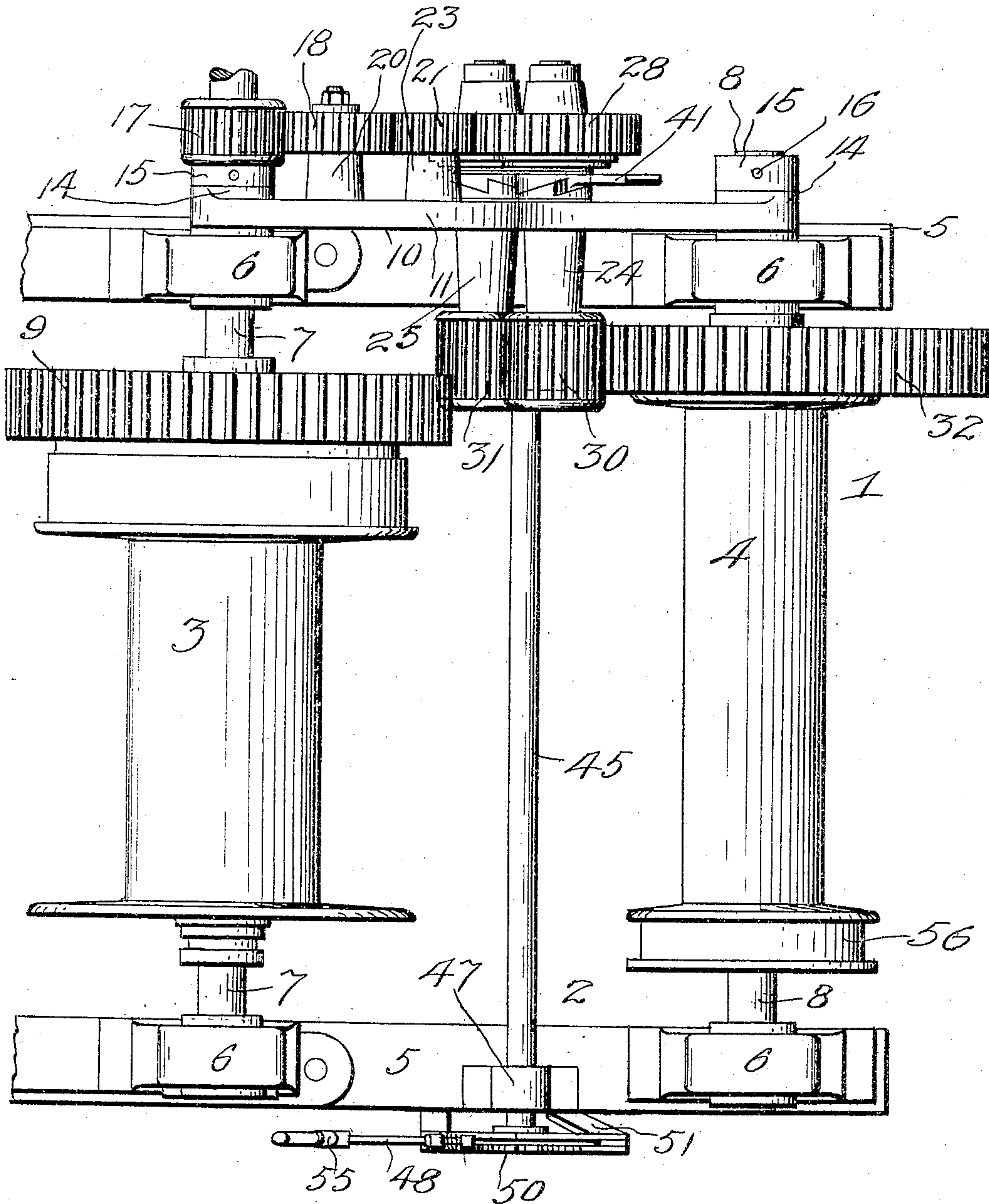
J. H. WERNER & S. FLORY.

REVERSING MECHANISM.

APPLICATION FILED AUG. 1, 1904.

3 SHEETS—SHEET 1.

FIG. 1



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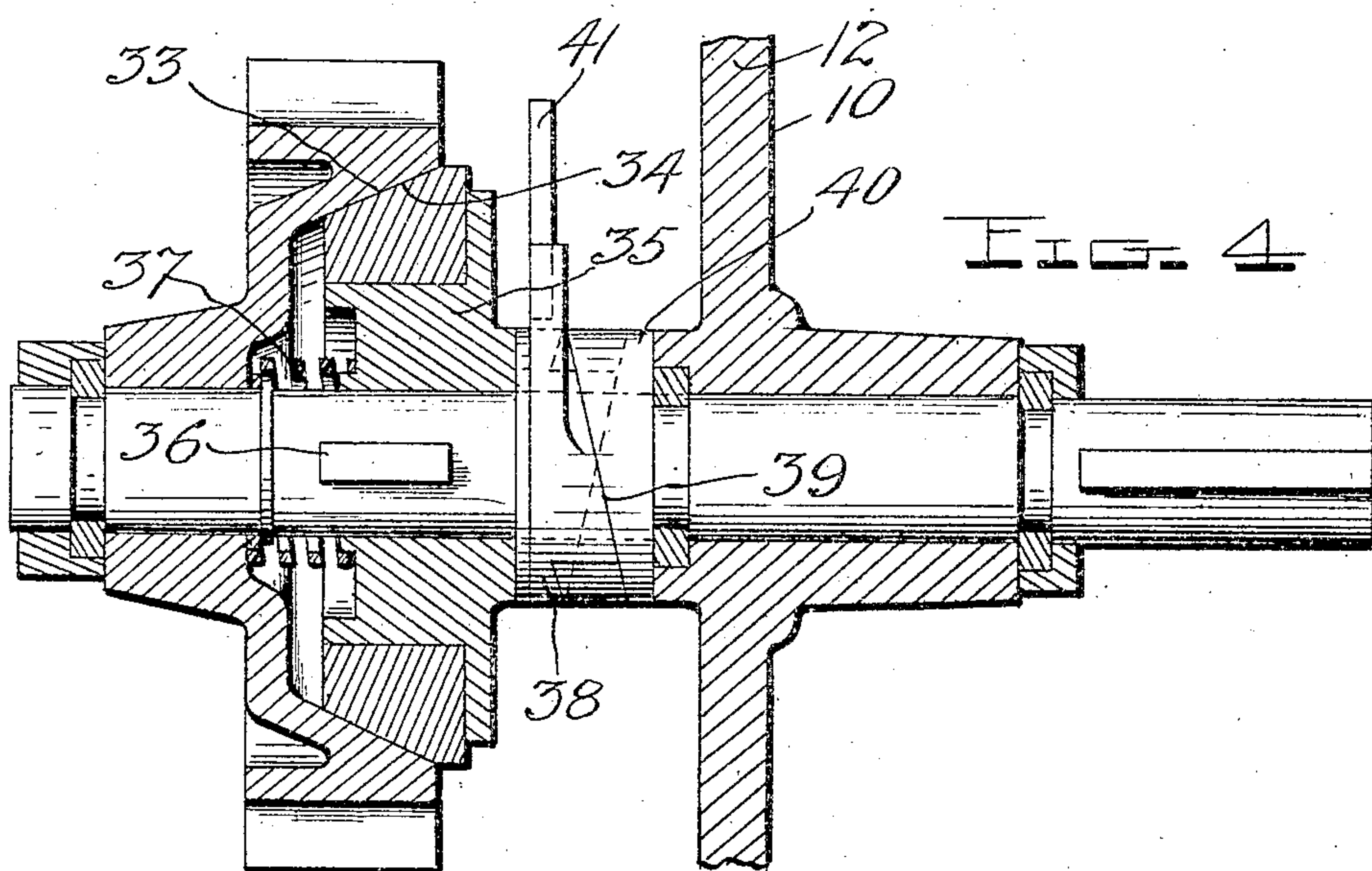
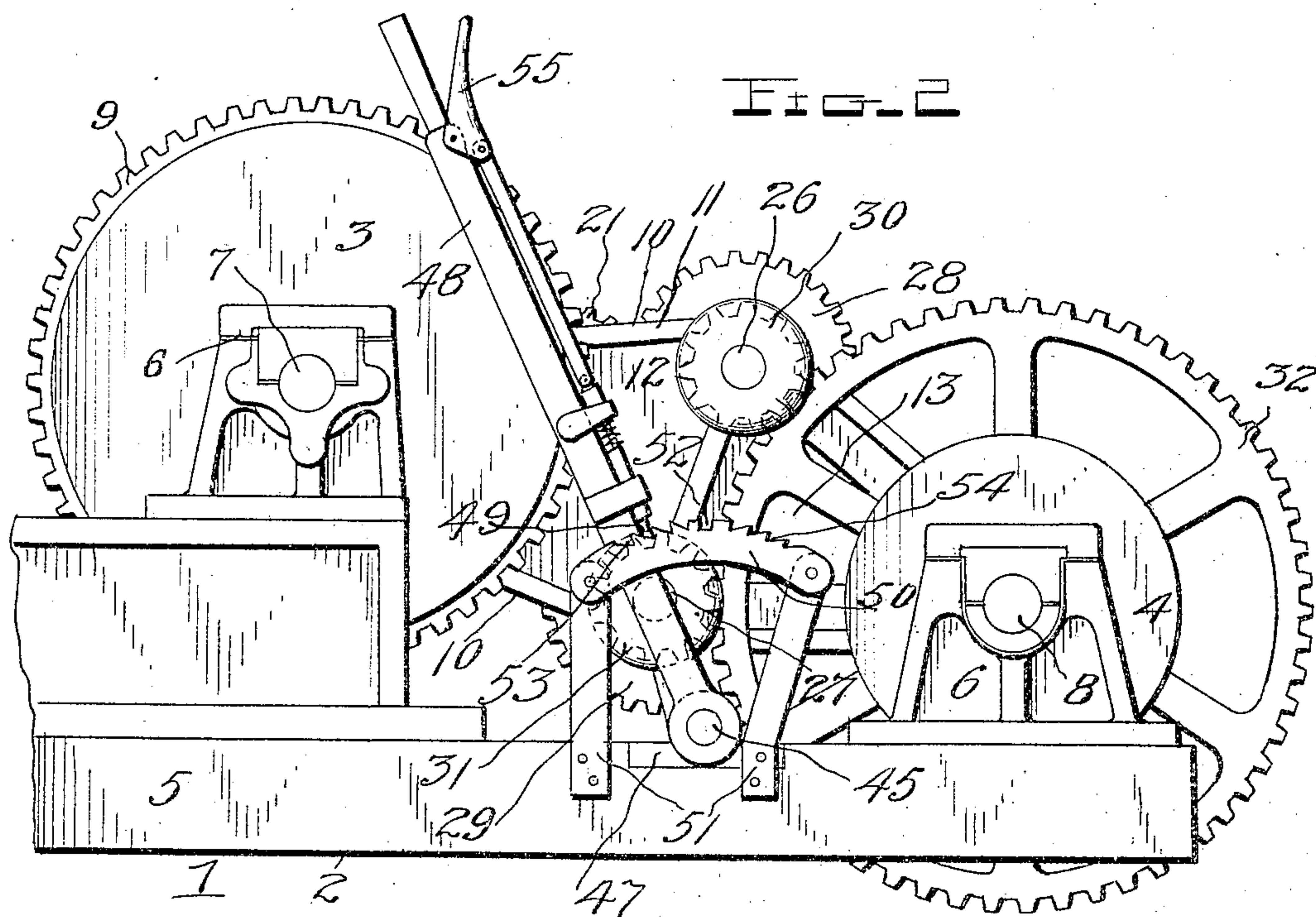
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3 SHEETS—SHEET 2.



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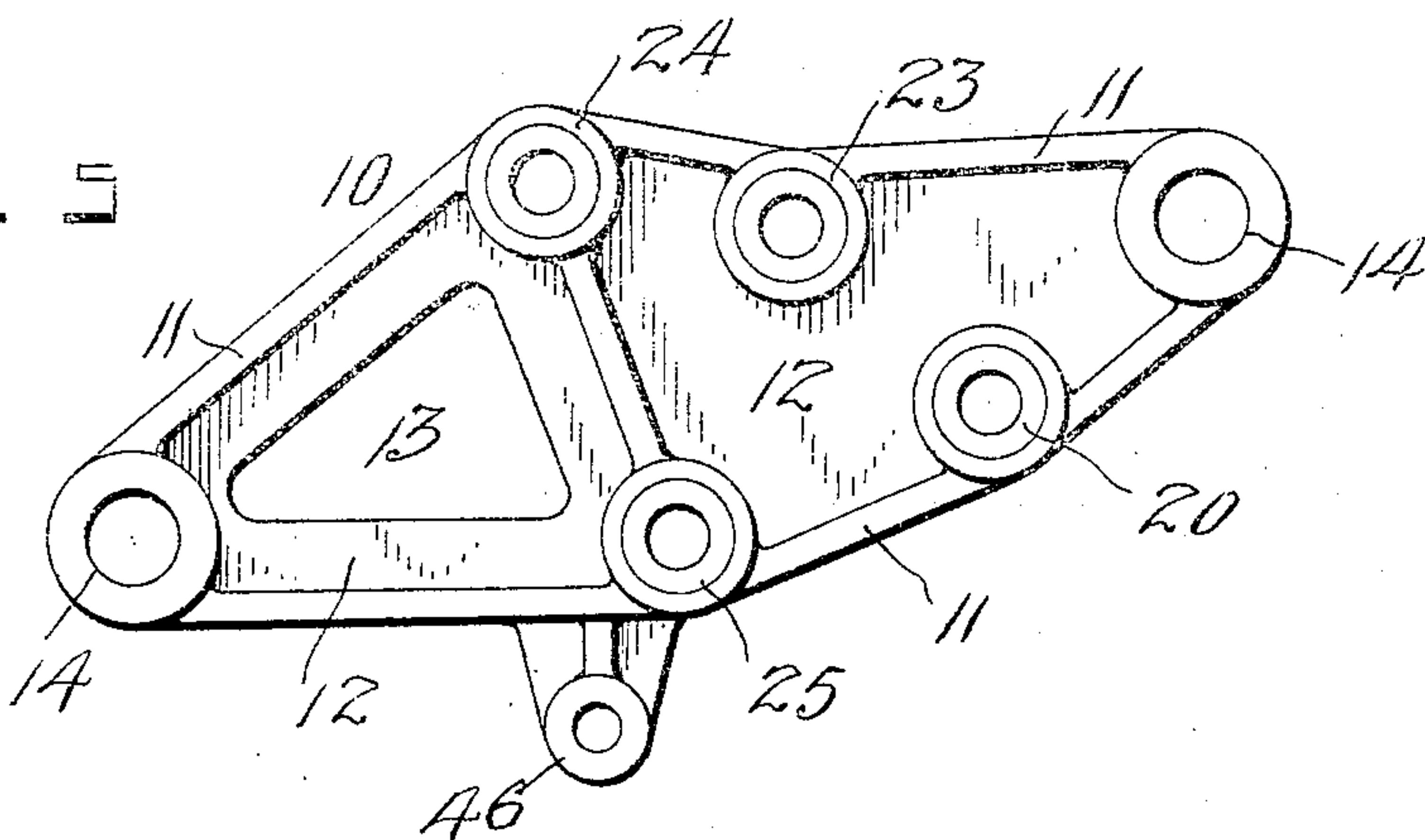
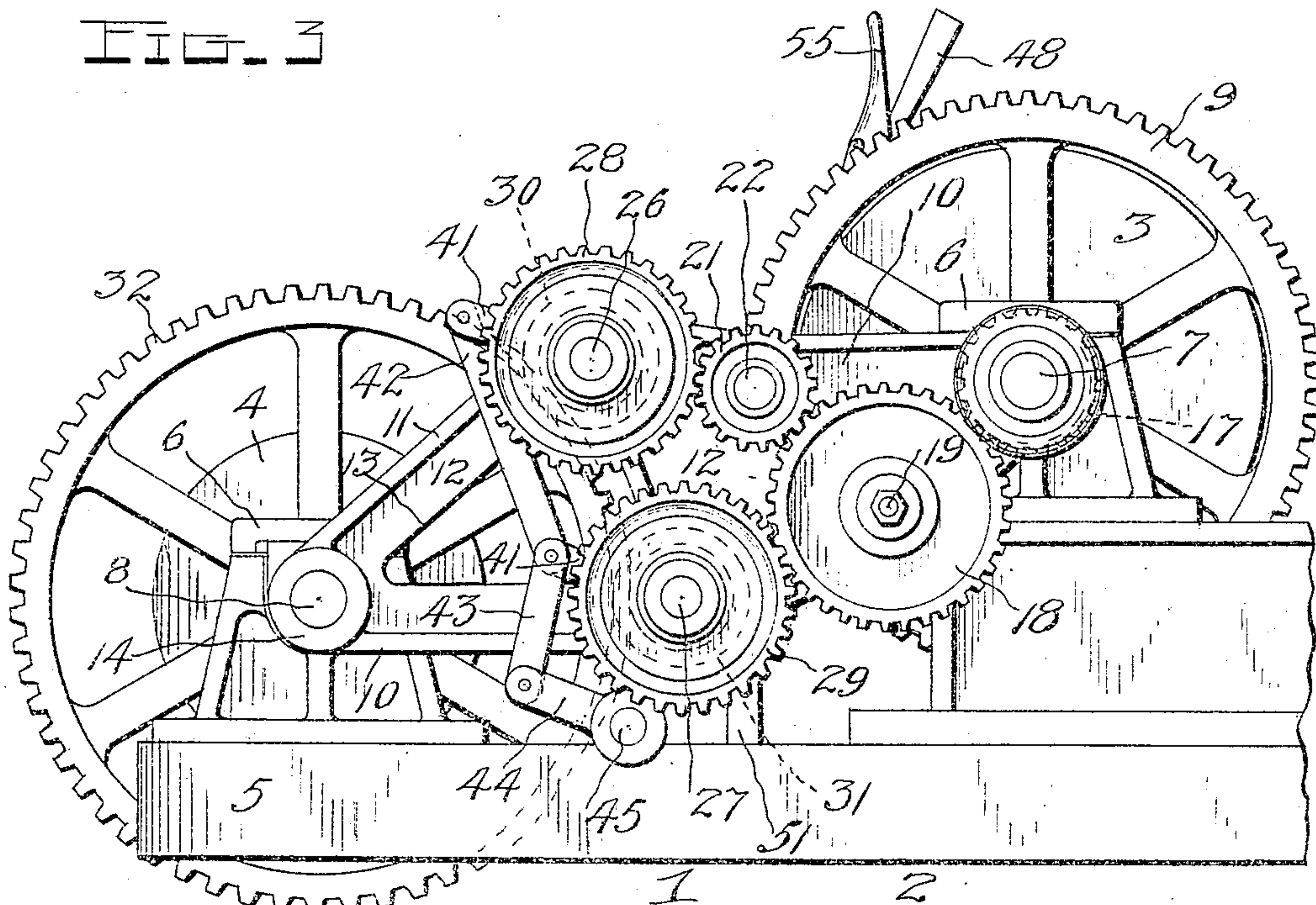
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3 SHEETS—SHEET 3.



Witnesses

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UNITED STATES PATENT OFFICE.

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REVERSING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 778,615, dated December 27, 1904.

Application filed August 1, 1904. Serial No. 219,124.

To all whom it may concern:

Be it known that we, JOHN H. WERNER and SAMUEL FLORY, citizens of the United States, residing at Bangor, in the county of North-
5 ampton and State of Pennsylvania, have invented certain new and useful Improvements in Reversing Mechanism; and we do declare the following to be a full, clear, and exact de-
10 scription of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to improvements in reversing-gear, and particularly in such gear-
15 ing used in hoisting-engines or similar apparatus for reversing the motion of the drum that controls the swinging boom of a derrick, crane, or the like.

One object of our invention is to provide a reversing gear or mechanism of this character
20 which may be readily applied to hoisting apparatus now in general use and which will be self-contained, so that it may be readily applied to or detached from a hoisting machine or apparatus without disturbing any of the
25 parts of the latter.

Another object of our invention is to improve and simplify the construction and operation of machines of this character, and thereby render them more efficient and dura-
30 ble in use and less expensive to manufacture.

With the above and other objects in view the invention consists of certain novel features of construction, combination, and arrangement of devices, as will be hereinafter
35 more fully described, and particularly pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a top plan view of a portion of a hoisting apparatus with our improved reversing mechanism
40 applied thereto. Fig. 2 is an elevation of one side of the machine. Fig. 3 is a similar view of the opposite side. Fig. 4 is a detail sectional view through one of the friction-clutches, and Fig. 5 is a detail view of the de-
45 tachable support or frame upon which the reversing mechanism is mounted.

Referring to the drawings by numerals, 1 denotes a portion of a hoisting-machine comprising a base 2 and two drums 3 and 4 mount-

ed thereon, the former being adapted to con- 50
trol the hoisting rope or cable of the hoisting apparatus and the latter the rope or cable which operates the swinging boom of a der-
rick, crane, or the like. Said parts may be of any suitable construction, but as here shown 55
comprise two longitudinally-disposed beams 5, upon which are secured bearings 6, in which the shafts 7 and 8 of the drums 3 and 4 are suitably journaled. The shaft 7 of the hoist-
ing-drum 3 is provided with a large gear 9, 60
to which power is applied to drive said drum and the mechanism hereinafter described, by means of which the shaft 8 of the drum 4 may be driven in either direction. As clearly shown
in Fig. 1 of the drawings, the ends of the 65
shafts 7 and 8 upon one side of the base 2 project outwardly beyond the bearings 6 and have mounted upon them a frame or support
10, upon which the reversing mechanism is mounted. Said frame 10 is preferably cast 70
in a single piece and is substantially diamond-shaped. As shown in Fig. 5, it comprises ribs or bars 11, united by webs 12, which may be formed with one or more openings 13 to
lessen the weight of the same without re- 75
ducing its strength. Said frame may be detachably mounted upon said shafts in any desired manner; but we preferably provide in each of its pointed ends bearing-openings 14.
80 through which the ends of the shafts 7 and 8 project. Said shafts rotate in said openings, and the frame is retained upon them, preferably, by means of removable collars 15, placed upon the ends of said shafts and secured by
85 bolts or other fastening means 16. Upon the outer end of the shaft 7, which extends beyond said collar 15, is removably secured a drive-
pinion 17, which is adapted to mesh with a large idler-gear 18, mounted upon a stub-shaft 19,
90 journaled in bearings 20, formed in the frame 10 adjacent to one of its ends. Said gear 18 is also in mesh with the small idler-gear 21, mounted upon a stub-shaft 22, journaled in a bearing 23, also formed in the frame 10.
95 Mounted in bearings 24 and 25, formed in the frame 10 adjacent to its center, are shafts 26 and 27, upon the outer ends of which are pinions 28 and 29, which mesh, respectively, with

said idlers 21 and 18, so that when the driving-shaft 7 is rotated said gears 28 and 29 will be rotated in opposite directions by means of said idlers. Upon the inner ends of said shafts 26 and 27 are keyed or otherwise secured pinions 30 and 31, which mesh with and drive a large gear 32, secured upon the driven shaft 8. In order to connect and disconnect the loosely-mounted gears 28 and 29 to and from their shafts 26 and 27, so that said gear 32 will be rotated, we provide upon each of said shafts a friction-clutch device, as clearly shown in Fig. 4 of the drawings. Said clutch device comprises two friction-cone members 33 and 34, the former of which is formed in one face of the gears 28 and 29 and the latter upon a head 35, which is keyed, as at 36, to rotate with the shaft, but at the same time is permitted to slide longitudinally thereon, so that its member 34 may be moved into and out of engagement with said member 33. A coil-spring 37 upon said shaft between said gear and said head is adapted to normally hold said members out of engagement with each other, so that said gear will act as an idler. To move the member 34 into frictional engagement with the member 33, and thereby lock said gear to rotate with said shaft, we provide upon the latter between said head 35 and one of the bearings 24 or 25 in the frame 10 a ring 38, formed with a cam-face 39, which coacts with a similar cam-face upon a ring 40, secured upon the frame 10. Said cam-ring 38 is provided with a lever 41, which when rotated in one direction will cause the head 35 to move against the tension of the spring 37 and lock the gear to the shaft and when moved in the reverse direction will permit said spring to force said head longitudinally and disconnect said gear from the shaft. The levers 41 of the two clutch devices are connected by a link 42, so that said devices are operated simultaneously, the cam-rings 38 and 40 being so arranged that when the levers 41 are operated one or the other of the gears will be locked to rotate with its shaft while the other will be disconnected. In this way it will be seen that the gear 32, and hence the drum 4, may be rotated in either direction, as desired.

In order to move the link 42 to operate the levers 41, the former is connected by a link 43 to an arm 44, secured upon one end of a rock-shaft 45, which extends transversely across the base 2 of the machine and is mounted in a bearing 46, formed upon the frame 10, and also in a bearing 47, secured upon the beam 5 upon the side of the machine opposite to that upon which the frame 10 is disposed. Upon the outer end of the shaft 45 adjacent to said bearing 47 is secured a hand-lever 48, carrying a sliding spring-actuated pawl 49, which is adapted to coact with a segmental rack 50, secured upon brackets 51, projecting

vertically from said beam 5. Said rack 50 is formed with a central notch 52 and a series of notches or teeth 53 and 54 upon opposite sides of said central notch. Said pawl 49 is adapted to be operated by the usual hand-piece 55, as clearly shown in Fig. 2, and to be engaged with the notches in said rack-bar to lock said lever in any desired position. When said pawl is in the central notch 52, the cam-rings of the clutch devices are so disposed that neither of the gears 28 or 29 is locked to its shaft; but when said lever is moved in either direction and its pawl engaged with one of the notches 53 or 54 one or the other of the gears 28 or 29 will be locked to rotate with its shaft, so that the gear 32, and hence the drum 4, may be rotated in the desired direction.

Upon one end of the drum 4 is provided a flanged brake-wheel 56, which is adapted to receive a brake-band (not illustrated) which may be of any suitable form and construction.

From the foregoing description, taken in connection with the accompanying drawings, it is thought that the construction, operation, and advantages of our invention will be readily understood without requiring a more extended explanation. It will be seen that by mounting the reversing-gear upon the detachable frame 10 it may be applied to and removed from the hoisting machine or apparatus without disturbing the parts of the latter, and it will be further noted that the reversing-gear is of such a strong and durable construction as to be well adapted for the purpose intended.

While we have shown and described the preferred embodiment of our invention, it will be understood that we do not wish to be limited to the precise construction herein set forth, since various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. The combination of a driving element, a shaft on which said driving element is mounted, a driven element, a shaft on which said driven element is mounted, a support mounted upon the shafts of said elements, and mechanism whereby the driven element may be driven by the driving element in either direction, said mechanism being mounted upon said support, substantially as described.

2. The combination of a driving element, a shaft on which said driving element is mounted, a driven element, a shaft on which said driven element is mounted, a frame or support detachably mounted upon the shafts of said elements, and driving connections be-

tween said elements mounted upon said frame or support, substantially as described.

3. The combination of a driving element, a shaft on which said driving element is mounted, a driven element, a shaft on which said driven element is mounted, a frame or support detachably mounted upon the shafts of said elements, and a reversing-gear for said elements mounted upon said frame or support.

4. In a hoisting apparatus, the combination of drum-shafts, a driving element mounted upon one of said shafts, a driven element mounted upon the other of said shafts, a frame detachably mounted upon said shafts, and reversing mechanism for said elements mounted upon said frame, substantially as described.

5. A reversing mechanism comprising a driven element, shafts, driving elements upon said shafts for operating said driven element, revoluble elements upon said shafts to rotate in opposite directions, clutch devices for connecting and disconnecting said revoluble elements to and from their shafts, and means for operating said clutch devices to connect one of said revoluble elements to its shaft and disconnect the other from its shaft, substantially as described.

6. A reversing mechanism comprising a driven element, shafts, driving elements upon said shafts for operating said driven element, revoluble elements upon said shafts to rotate in opposite directions, clutch devices for connecting and disconnecting said revoluble elements to and from their shafts, levers upon said clutch devices, and a link connecting said levers for simultaneously operating said clutch devices, substantially as described.

7. A reversing mechanism comprising a driven element, shafts, driving elements upon said shafts for operating said driven element, revoluble elements upon said shafts to rotate in opposite directions, clutch devices for connecting and disconnecting said revoluble elements to and from their shafts, a connection between said clutch devices to cause them to be operated simultaneously, a lever for operating said connection, and means for locking said lever.

8. A reversing mechanism comprising driving and driven shafts, intermediate shafts, rotary elements secured upon said intermediate shafts for rotating one of the first-named shafts, rotary elements loosely mounted upon said intermediate shafts, driving connections between said loosely-mounted rotary elements and one of the first-named shafts, for rotating said loosely-mounted rotary elements

in opposite directions, and means for connecting and disconnecting said loosely-mounted rotary elements to and from their shafts.

9. A reversing mechanism comprising driving and driven shafts, intermediate shafts, rotary elements secured upon said intermediate shafts for rotating one of the first-named shafts, rotary elements loosely mounted upon said intermediate shafts, driving connections between said loosely-mounted rotary elements and one of the first-named shafts, for rotating said loosely-mounted elements in opposite directions, friction-clutches upon said intermediate shafts for connecting and disconnecting said loosely-mounted rotary elements to and from said shafts, and means for simultaneously operating said friction-clutches, substantially as described.

10. A reversing-gear comprising driving and driven shafts, gears upon said shafts, a frame detachably mounted upon said shafts, intermediate shafts mounted in said frame, pinions upon said intermediate shafts in mesh with the gear upon said driven shaft, gears upon said intermediate shafts revoluble in opposite directions, a train of gears mounted upon said frame and connecting said gears which revolve in opposite directions with the gear on said driving-shaft, clutch devices for connecting and disconnecting said gears which revolve in opposite directions to and from their shafts, and means for operating said clutch devices, substantially as described.

11. In a hoisting apparatus, the combination of a driving-shaft, a driven drum-shaft, gears upon said shafts, a frame detachably mounted upon said shafts, intermediate shafts mounted in said frame, pinions upon said intermediate shafts in mesh with the gear upon said driven shaft, gears upon said intermediate shafts revoluble in opposite directions, a train of gears mounted upon said frame and connecting said gears which revolve in opposite directions with the gear of said driving-shaft, friction-clutches upon said intermediate shafts for connecting and disconnecting the same to and from their gears which revolve in opposite directions, and means for simultaneously operating said clutch devices, substantially as described.

In testimony whereof we have hereunto set our hands in presence of two subscribing witnesses.

JOHN H. WERNER.
SAMUEL FLORY.

Witnesses:

ANDREW A. BRUCH,
JAMES B. GORDON.