

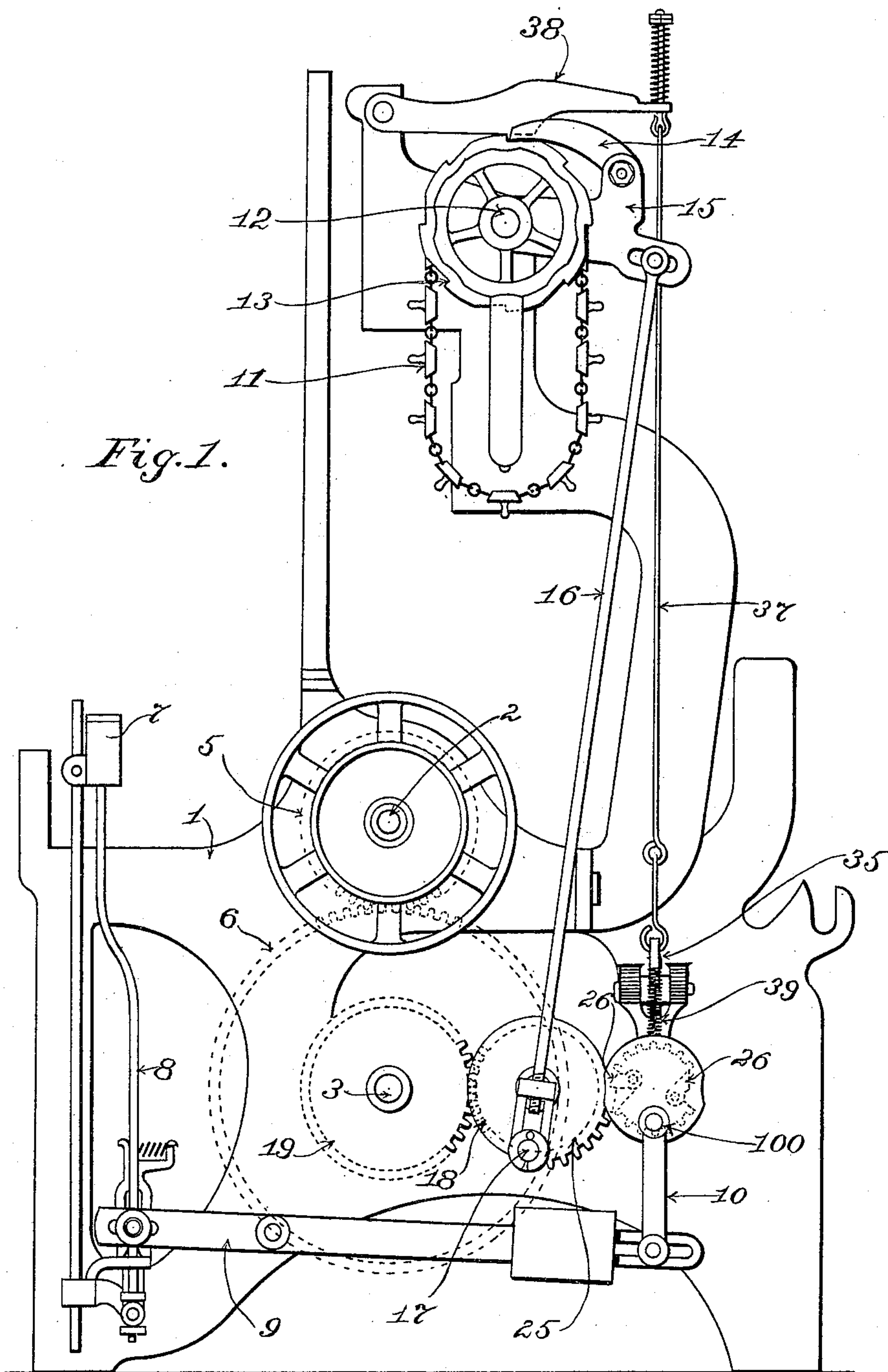
(No Model.)

2 Sheets—Sheet 1.

H. BARDSLEY.  
BOX MOTION FOR LOOMS.

No. 583,425.

Patented May 25, 1897.



Witnesses  
Oscar F. Bill.

Robert Wallace.

Inventor

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(No Model.)

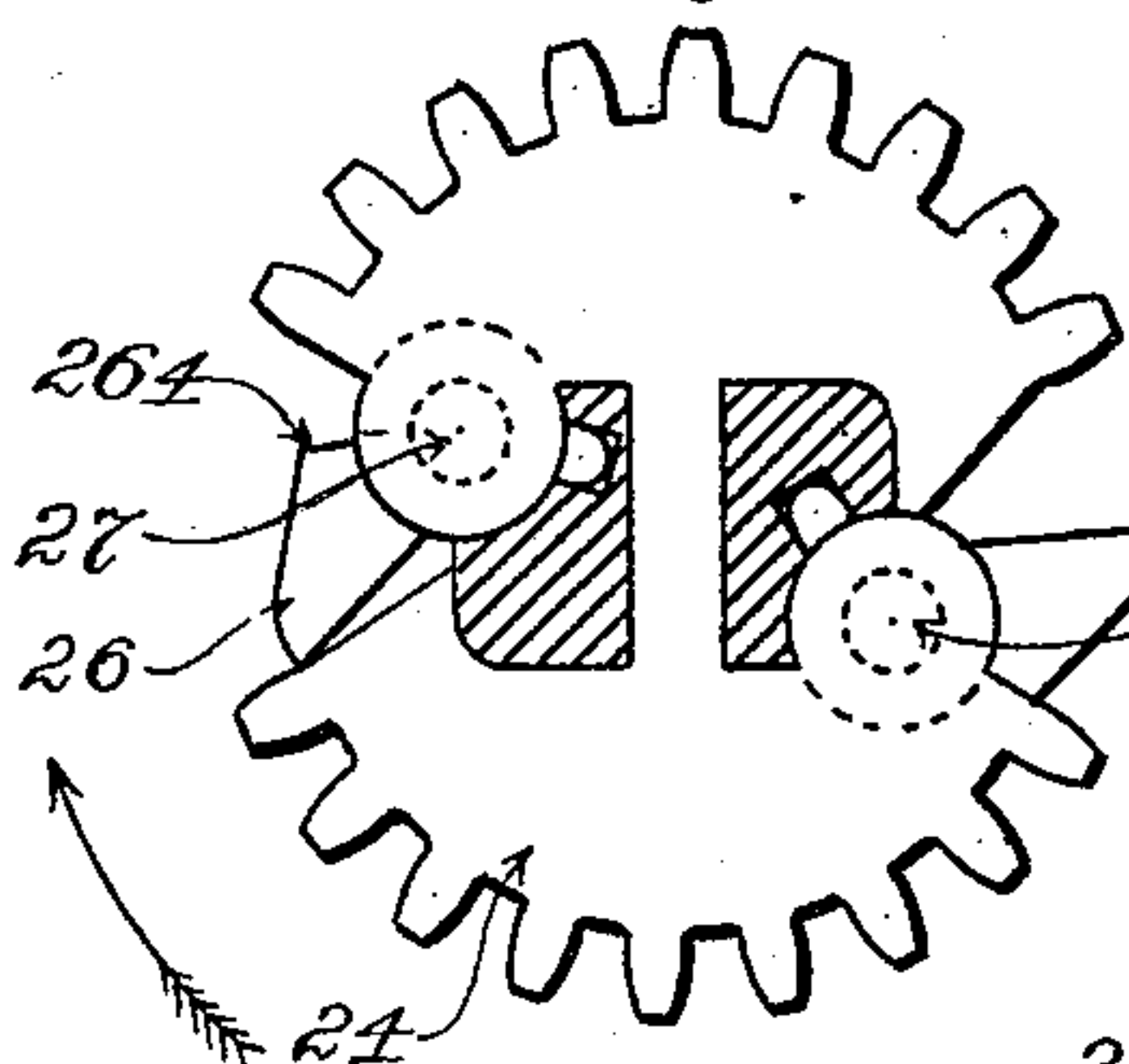
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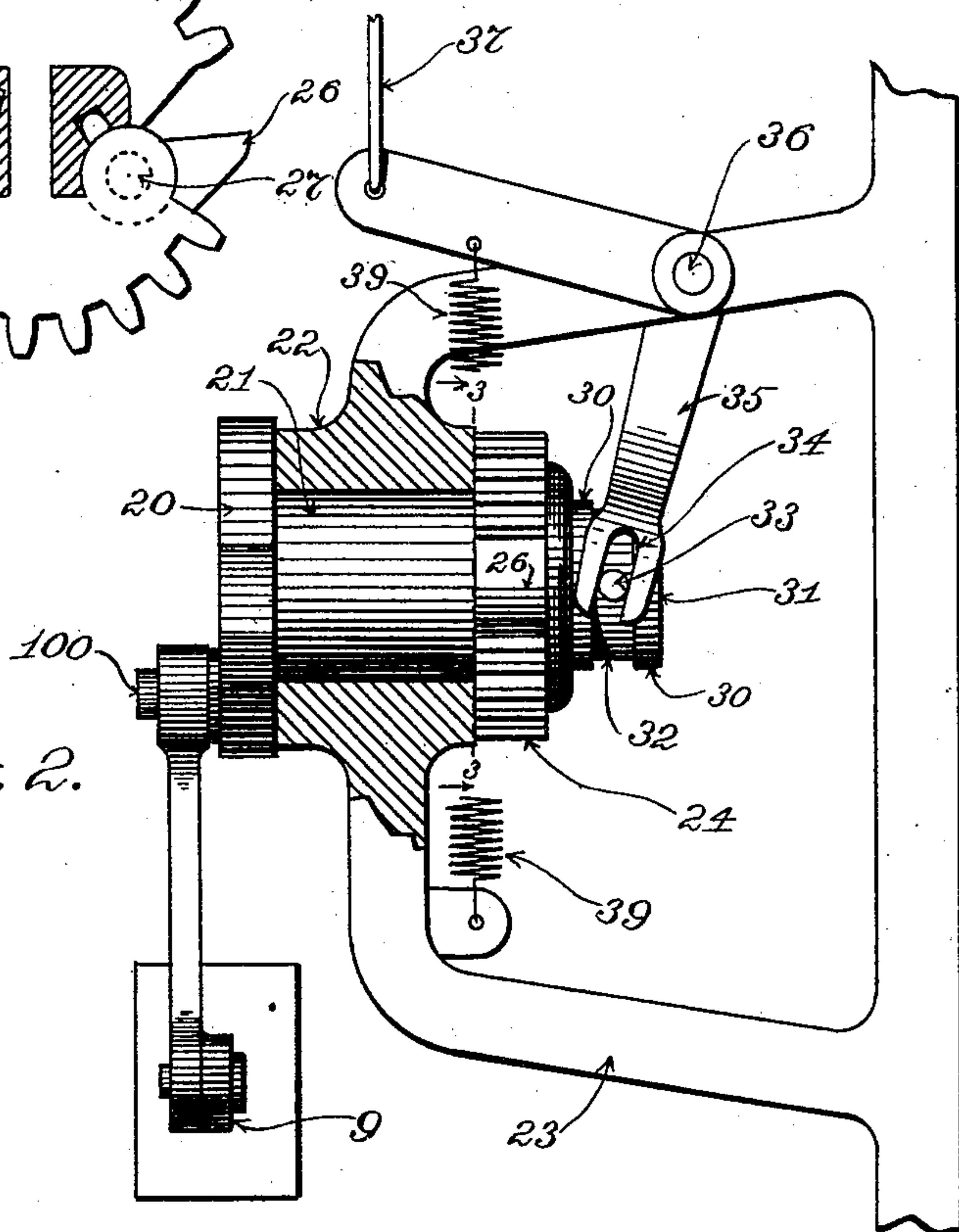
*Fig. 3.*



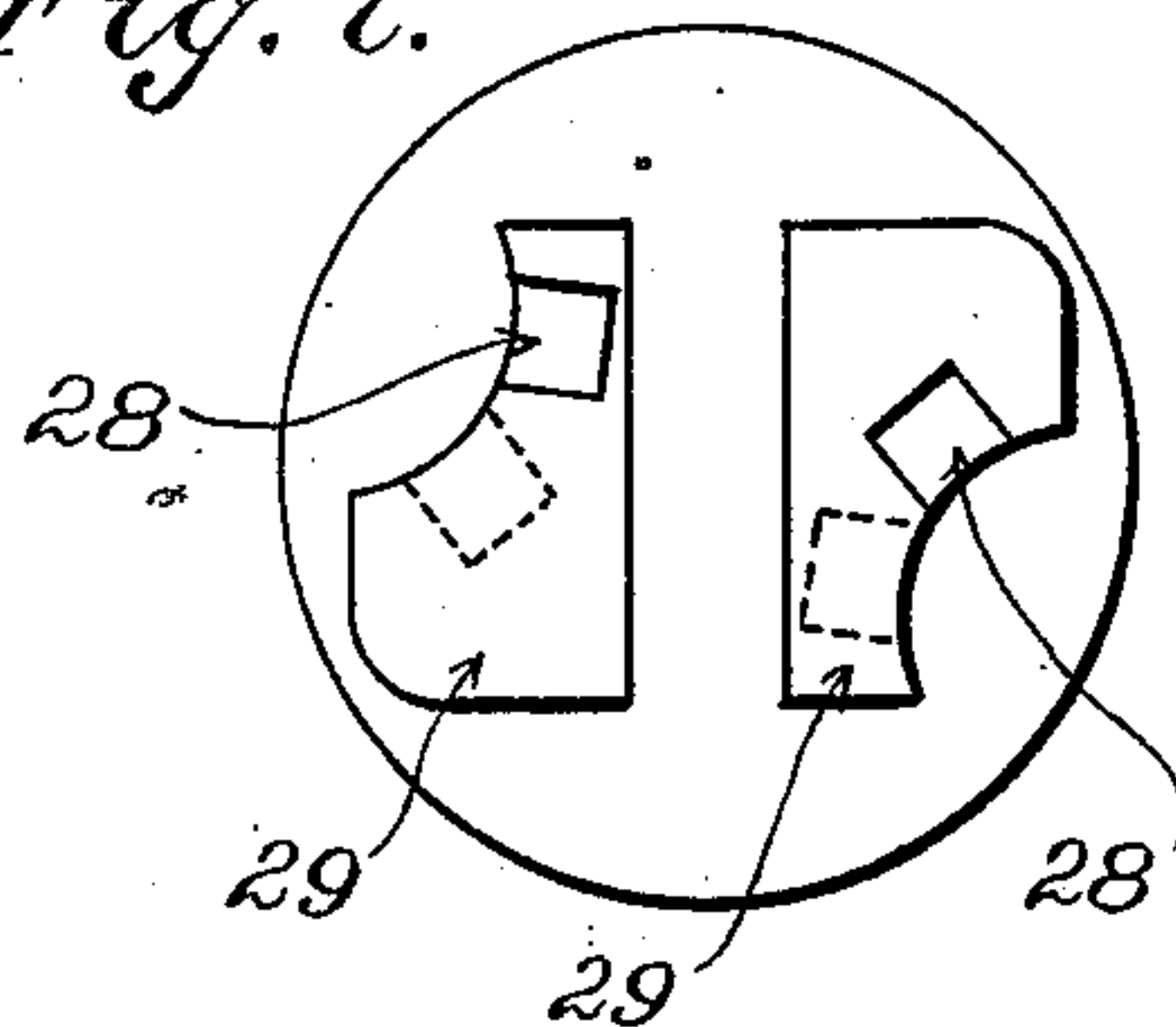
*Fig. 4.*



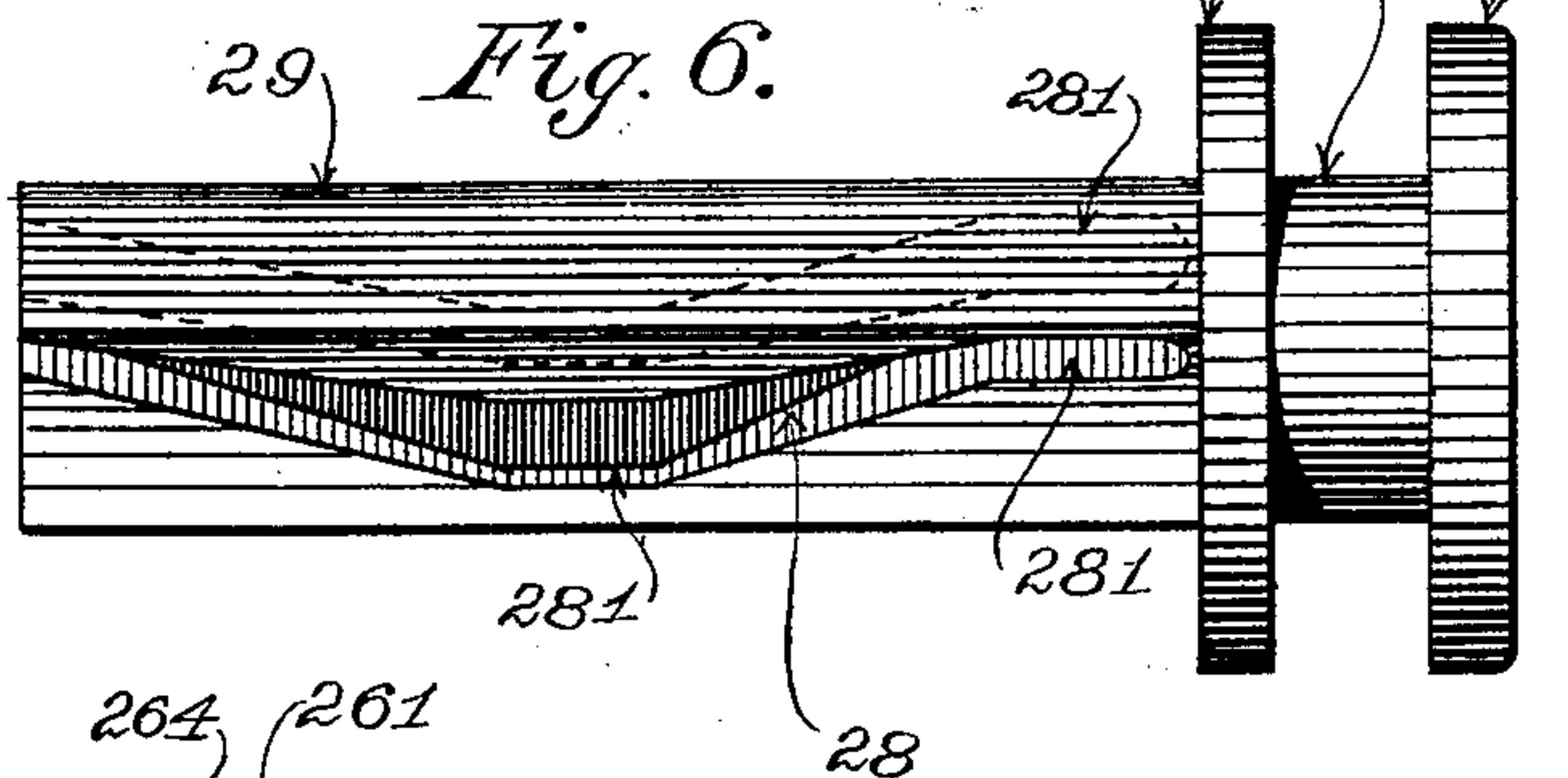
*Fig. 2.*



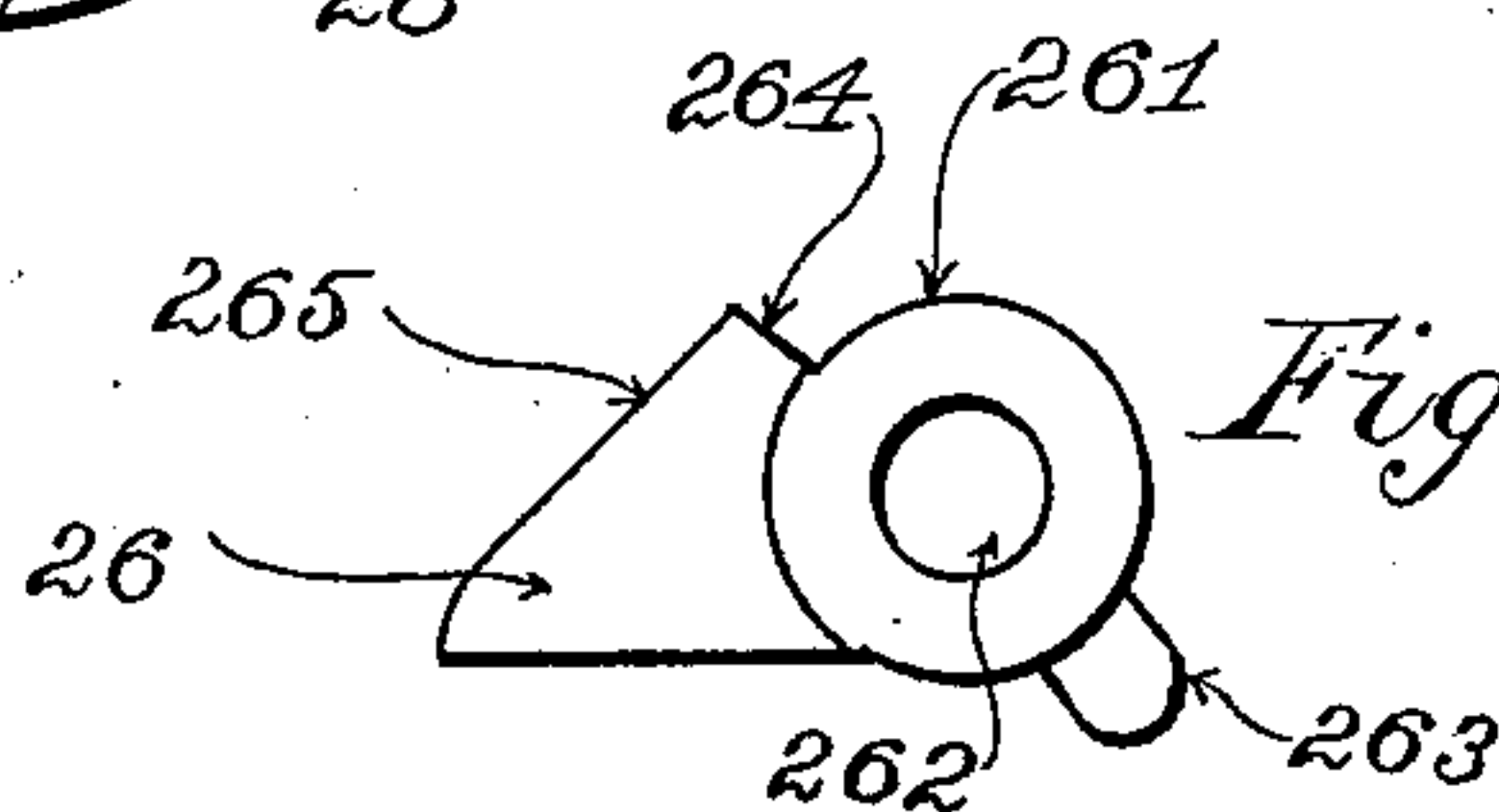
*Fig. 2.*



*Fig. 6.*



*Fig. 5.*



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# UNITED STATES PATENT OFFICE.

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KNOWLES LOOM WORKS, OF WORCESTER, MASSACHUSETTS.

## BOX-MOTION FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 583,425, dated May 25, 1897.

Application filed February 4, 1897. Serial No. 621,912. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY BARDSLEY, a citizen of the United States, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Box-Motions for Looms, of which the following is a specification, reference being had therein to the accompanying drawings.

The invention will be described first with reference to the accompanying drawings, after which the distinguishing features thereof will be more particularly pointed out and distinctly defined in the claims at the close of this specification.

Figure 1 of the drawings shows in side elevation the framing of a loom having my present invention applied thereto, sufficient being shown to make clear the mode of applying and using the said invention. Fig. 2 shows in rear elevation the box-operating crank and its immediate connections, part of the support being in vertical section. Fig. 3 is a view in vertical section on line 3 3 of Fig. 2. Fig. 4 shows the toothed gear of Fig. 2 in edge view. Fig. 5 is a view showing detached one of the rocking teeth of the said toothed gear. Fig. 6 is a view in side elevation of the shifting cam-piece, by means of which to cause the rocking teeth of the said toothed gear to rock. Fig. 7 is an end view of the said device of Fig. 6, looking from the left-hand side in Fig. 6.

1, Fig. 1, is the loom-framing. 2, same figure, is the crank-shaft of the loom.

3 is the cam-shaft.

5 6 are the gear-wheels, by which motion is transmitted from the crank-shaft to the cam-shaft.

7 represents the shuttle-boxes.

8 is the box-rod.

9 is the box-lever.

10 is the operating connecting-rod, which joins the rear end of the said box-lever 9 with the operating-crank 100.

11 is the pattern-chain for the box-motion, it passing around a suitable chain-barrel which is mounted on the shaft 12, the latter being supported by the elevated part of the loom-framing.

13 is the ratchet-wheel, which is connected with the pattern-barrel 12.

14 is the pawl which engages with the ratchet-wheel 13 for the purpose of actuating the pattern-barrel and pattern-chain.

15 is the swinging arm or carrier on which the pawl 14 is pivoted. 16 is the connecting-rod, which joins the said arm or carrier 15 to the crank 17 on the gear 18.

19 is a gear on the cam-shaft 3, which engages with gear 18 to rotate the latter.

The foregoing parts are usual parts of a loom and are or may be as usual or as preferred.

The crank 100 is carried by a disk 20, having a hub 21, which latter is mounted to turn in a bearing 22, that is provided in a suitable bracket 23, which is applied to the loom-framing.

24 is a partially-toothed gear which is connected with the hub 21, so that the said gear and the disk 20, with its crank 100, rotate in unison. This gear has blank or toothless spaces at one hundred and eighty degrees apart, as shown most clearly in Fig. 3, these spaces separating the teeth of gear 24 into two segments.

25 is a segment-gear which is connected with gear 18 and rotates in unison therewith. This segment-gear constitutes a moving toothed surface for engagement with the gear 24, and its teeth are sufficient in number to act, in connection with one of the gear-segments of gear 24 and with also one of the rocking teeth which are referred to hereinafter, to occasion a semirotation of said gear 24 and the hub and crank-disk which are connected therewith, so as through connecting-rod 10 to move the box-lever 9 and shift the boxes 7.

26 26 are rocking teeth which are applied to the partially-toothed gear 24 at the blank spaces of the latter; the said gear 24 being recessed where the said blank spaces exist for the reception and play of the said rocking teeth. Each rocking tooth 26 has a hub portion 261, the latter having a hole 262 for the passage of a pivotal pin 27, Fig. 3, by which to pivotally connect it with the gear 24. The precise construction in this connection is not material. Each of the said rocking teeth has also a pin or projection 263, by means of which to move the tooth on its pivot. The pins or projections 263 263 of the two rocking teeth engage the cam-slots 28 28, which are formed



in the concave outer faces of the two longitudinal portions or arms 29 29 of an actuating cam-piece 31, the said cam-piece 31 having collars 30 30, between which is received  
 5 a ring 32, having pins 33 at opposite sides thereof playing in slots 34 in the extremities of the members of the forked depending arm of a bell-crank 35, such as usually is employed in the like connections in box-motions for  
 10 looms. Said bell-crank is pivoted at 36 to the bracket 23 and has joined thereto the lower end of a connection or wire 37, the upper end of which is connected in usual manner with the usual pattern finger or lever 38,  
 15 which latter rests upon the pattern-chain and is acted upon by the risers thereon. The said risers act, through the said pattern-finger and the other devices which have been described, to move the cam-piece 31 length-  
 20 wise in one direction—for example, toward the left in Fig. 2. For the purpose of moving the said cam-piece in the reverse direction—namely, toward the right in Fig. 2—the spring 39 is employed, it having one end thereof con-  
 25 nected with one arm of the bell-crank 35 and the other end thereof connected with a suitable portion of the framing.

Each slot 28 has two straight portions 281 281, extending parallel with the length of the  
 30 cam-piece 31 and on different lines which are parallel to each other, these parallel portions being connected by inclined portions, as shown clearly in Fig. 5. The said portions 281 281 constitute rests to hold the respective  
 35 rocking teeth 26 26 fixed in the respective positions which are given them by each lengthwise movement of the cam-piece, the inclined connecting portions of the slots acting as cams to rock the respective rocking teeth on  
 40 their pivots. The two cam-slots are formed or disposed, as illustrated in Figs. 6 and 7, so that when by the lengthwise movement of the cam-piece 31 one tooth 26 is rocked into the position shown at the left in Fig. 3—that is to  
 45 say, retracted—the other tooth 26 is rocked into the position shown at the right in the said figure—that is to say, projected. Each rocking tooth 26 has a contacting-surface 264, adapted to bear against the adjacent end of  
 50 one of the gear-segments of the gear 24 when the tooth is in its projected position, as at the right in Fig. 3. The said tooth is formed, as indicated, with a sloping outer surface at 265, so that when the tooth is in the retracted  
 55 position, which is shown at the left in Fig. 3, the rocking tooth will be wholly out of the range of movement of the gear-segment 25. The contact of the surface 264 with the adjacent end of a gear-segment of gear 24, as at  
 60 the right in Fig. 3, affords a firm backing for the rocking tooth when the enlarged first tooth (see Fig. 1) of the segment-gear 25 comes around in the rotation of the latter and engages with such rocking tooth. As will be  
 65 understood, when the cam-piece is moved in the proper direction to cause a rocking tooth to become projected into the path of the said

enlarged first tooth the gear 24 and connected parts will be impelled, by the engagement of said first tooth with the said rocking tooth in  
 the direction of the arrow in Fig. 3, to bring the teeth of the following segment of gear 24  
 around into position to be engaged by the teeth of segment-gear 25, whereupon gear 24  
 and the connected parts, including the crank  
 75 100, will be rotated through one hundred and eighty degrees, thereby shifting the shuttle-boxes, after which the segment-gear will run out of mesh with the teeth of gear 24 at a blank space on the latter, the rocking tooth  
 80 in such space being retracted, as will be understood from what precedes. The gear 24 and connected parts then will remain without movement of rotation, holding the shuttle-boxes in the position which was given  
 85 them by the described movement of the parts until the cam-piece is moved in the opposite direction lengthwise by the action of the described devices, so as to project the other previously-retracted rocking tooth into the  
 90 range of the segment-gear 25.

At the free ends of arms 29 29 of cam-piece 31 the slots 28 28 are open-ended for convenience in assembling and separating the parts,  
 this construction enabling the cam-piece con-  
 95 veniently to be slipped into place or removed after the rocking teeth have been mounted in the gear 24.

Any usual or suitable arrangement of devices to prevent overrunning of the crank 20  
 100 at each movement thereof may be employed. Inasmuch as these devices are commonly employed and the manner of their application to the mechanism of the present case will be perfectly obvious to all skilled in the art, I  
 105 have deemed it unnecessary to represent the same herein.

I claim as my invention—

1. The combination with a moving toothed surface, a gear having toothless spaces on op-  
 110 posite portions thereof, operating connections intermediate such gear and the shuttle-boxes, and the said shuttle-boxes, of rocking teeth located in the said toothless spaces, a cam-piece having slots which receive portions of  
 115 the said teeth, and thereby cause them to rock as the said cam-piece is moved, and means for moving said cam-piece, substantially as described.

2. The combination with a driver constituted by a moving toothed surface, of the driven gear having the toothless spaces on opposite portions thereof, the rocking teeth located in the said toothless spaces, the cam-piece having slots which receive portions of  
 125 the said teeth and means for moving said cam-piece, substantially as described.

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

HENRY BARDSLEY.

Witnesses:

CHAS. F. RANDALL,  
 EDITH J. ANDERSON.