(No Model.)

# B. HOLMES.

## FRICTION GEARING.

No. 560,130. Patented May 12, 1896.

Fig.1

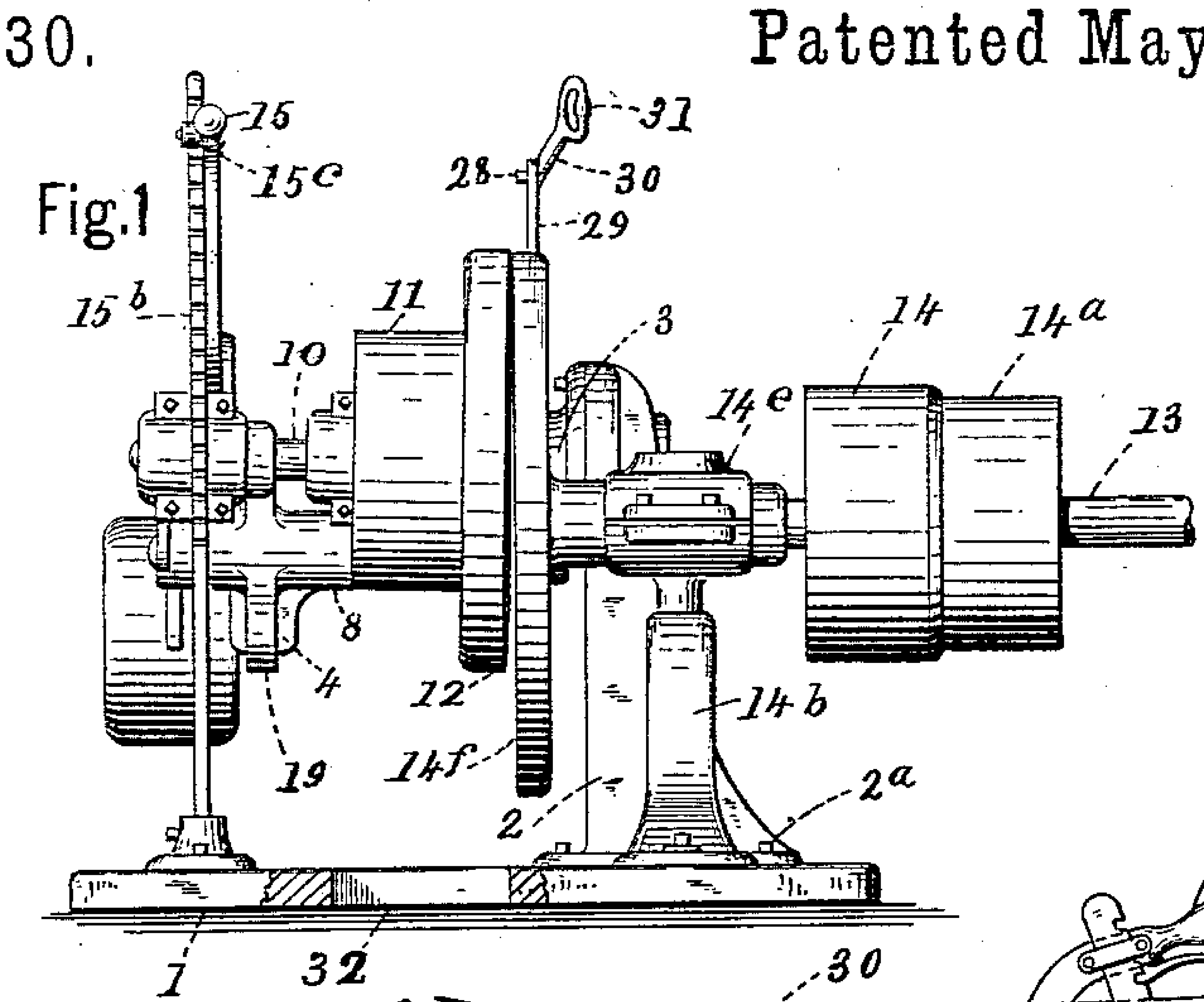



Fig.2

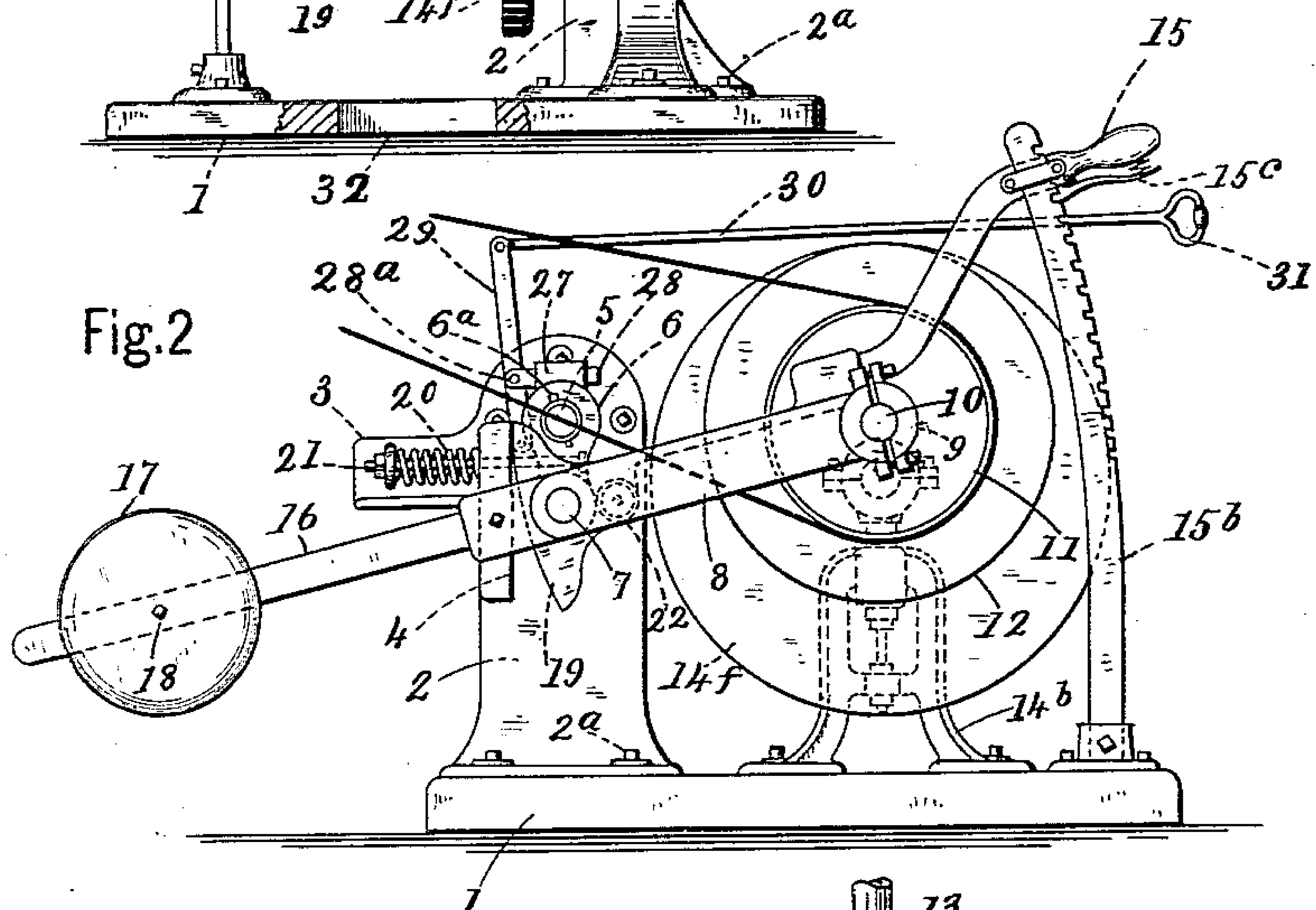
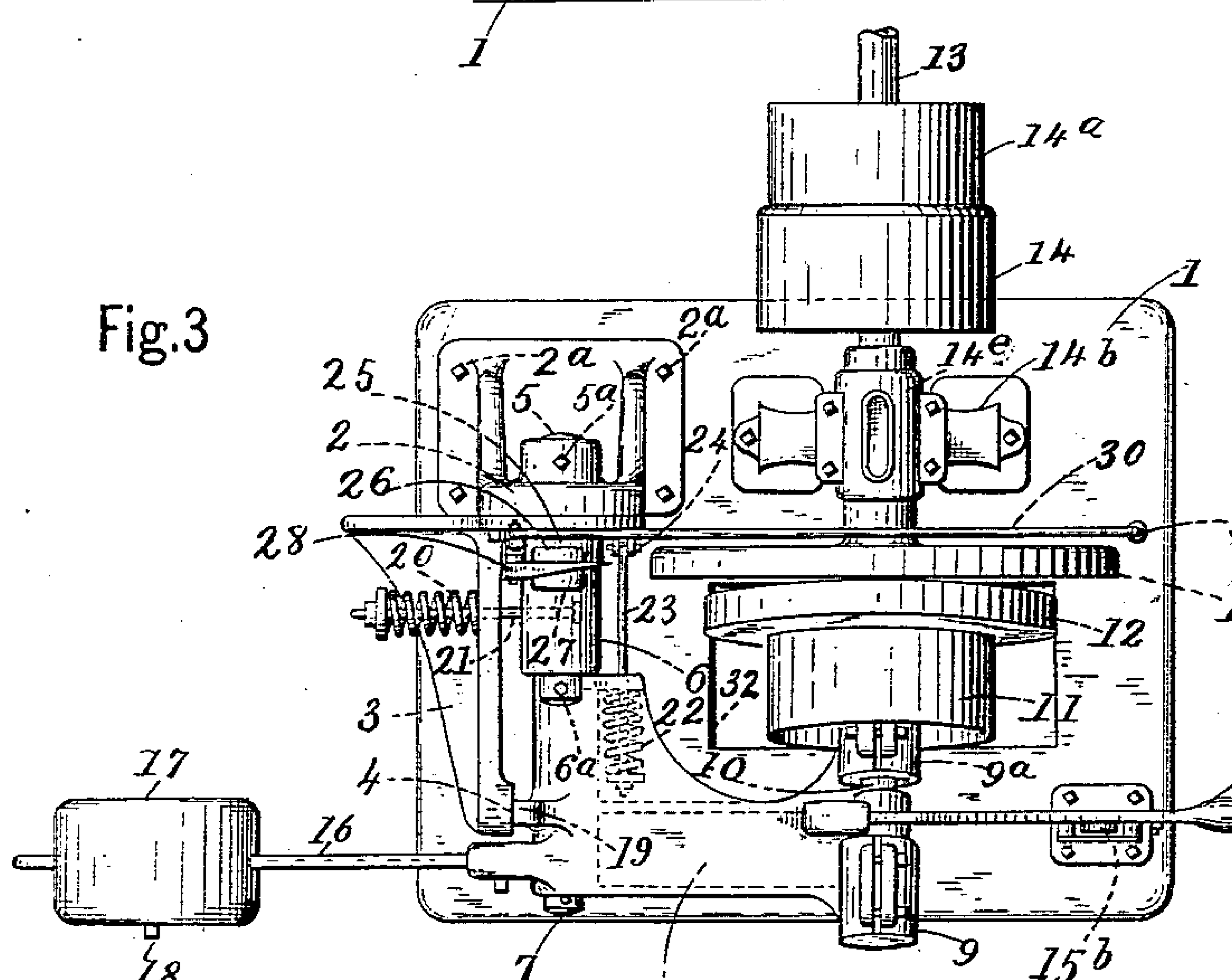



Fig.3




Witnesses.

J. P. Hill,
Harriet Johnson

Britain Holmes Inventor.

By James Sangster Attorney.

# UNITED STATES PATENT OFFICE.

BRITAIN HOLMES, OF BUFFALO, NEW YORK, ASSIGNOR TO JAMES SANGSTER, OF SAME PLACE.

## FRICTION-GEARING.

SPECIFICATION forming part of Letters Patent No. 560,130, dated May 12, 1896.

Application filed February 18, 1893. Serial No. 462,817. (No model.)

*To all whom it may concern:*

Be it known that I, BRITAIN HOLMES, a citizen of the United States, residing in Buffalo, in the county of Erie and State of New York, have invented certain new and useful Improvements in Friction-Gearing, of which the following is a specification.

My invention relates to an improved variable-motion friction-gear and will be fully and clearly hereinafter described and claimed, reference being had to the accompanying drawings, in which—

Figure 1 is a front elevation of the friction-gearing and its operating mechanism. Fig. 2 represents a side elevation of the same. Fig. 3 is a plan or top view of the device complete.

In said drawings, 1 represents the base or supporting-frame. It is provided with a stationary upright supporting frame-piece 2, which is rigidly bolted to the base by bolts $2^a$. To the stationary frame-piece 2 is firmly secured a horizontal frame-piece 3 by bolts or in any well-known way, or it may be formed in one piece with it, and on this bracket or frame-piece 3 is a plane-faced vertical portion 4. A pin 5 is rigidly fixed to the upright supporting-frame 2 by being closely fitted in said frame and secured by a set-screw $5^a$. On this pin 5 is mounted a connecting-link 6, so as to swing on said pin 5. The link 6 has also a slight longitudinal movement on the pin 5, the retaining-pin $6^a$ (see Fig. 3) being secured in place a sufficient distance from the link 6 to allow for said longitudinal movement, the object of which will be explained farther on.

To the lower end of the link 6 is rigidly secured a pin 7 and on this pin is mounted a supporting-frame 8. At the front of the frame 8 is mounted in boxes 9 and $9^a$, so as to turn therein, a shaft 10, carrying the pulley 11 and friction-disk 12. This friction-disk, it will be noticed, may be made in the form of a frustum of a cone, the cone portion being very slight, so that the shaft 10 is but little out of line with the shaft 13, which may be the counter-shaft for driving a planing or other machine, and is provided with the usual tight and loose pulleys 14 $14^a$. It is mounted in suitable boxes, one of which is shown at $14^e$ on the upright frame $14^b$. At the front end of the shaft 13 is mounted and rigidly secured a circular disk $14^f$, against which the disk 12 is in contact while in action.

By locating the disks as above described it is evident that their working or operative flat faces will be unobstructed or without any projection to interfere with each other in their movements across the face of each other and will occupy planes at a slight angle to each other, and that only a line or small portion of each will be in contact with the other at any time. As the disks revolve the portions of the disks forming the line of contact of the two surfaces will gradually approach each other, then be in actual contact for an instant, during which time they will both travel at the same rate of speed and in the same direction. Then they will gradually pass out of contact and away from each other until they have passed to their greatest distance from each other, which is at a point diametrically opposite their point of contact, when they will again gradually approach each other, come in contact and again recede from each other. By this means the friction between them when in contact is reduced to a minimum, as the places of contact of the two surfaces travel at the same speed and in the same direction, the only difference in their direction being that caused by the different diameters of the disks at their places of contact. Hence there can be but little more wear upon the disks than would be if they were simply placed in contact and again separated, whereas if the disks were placed at right angles to each other their points of contact would move in two planes at right angles to each other, which would necessarily cause the surfaces to grind against each other during the time and distance they were in contact. The movable supporting-frame 8 is also provided with a handle 15 at its front end, by which it is easily rocked up or down on its supporting-pin 7. It may be secured at any point of its adjustment by means of the usual curved notched bar $15^b$ and its spring-actuated pawl $15^c$, as will be readily understood.

At the rear end of the rocking frame 8 is rigidly secured a bar 16, provided with a counterweight 17 and made adjustable along said bar by means of a set-screw 18, which balances it so it can be easily operated by the handle 15. The rear end of the rocking frame 8 is provided with a curved portion 19, the face of which rests against the vertical face 4 of the bracket 3. The curved face of the portion 19 (see Figs. 2 and 3) forms a portion of a circle, the center of which would be the shaft 10. The object of this construction is to cause the disk 12 to move in a straight line either up or down parallel with the face 4 when the handle 15 is operated.

To keep the face of the curved portion 19 in contact with the face 4, I employ a spiral spring 20 and a rod 21, connected with the link 6. Although it is best to move one of the disks in a straight line across the face of the other disk, it may be made to move in a curved line by any well-known means. The friction-disk 12 is also kept in close contact with the disk $14^f$ by means of a spiral spring 22 (shown by dotted lines in Figs. 2 and 3,) and a rod 23, connected with the spring and having its opposite end pivoted by a pin 24 to the stationary frame 2, but a weight or other equivalent well-known means may be used instead of the spring for this purpose.

Projecting from the face of the stationary frame 2 is a boss or hub 25, against which the link 6 fits when in place. On the top of the hub 25 is an upwardly-projecting lug 26, and directly opposite it on the link 6 is another lug 27, having an inclined side, thereby leaving a wedge-shaped opening into which the wedge 28 passes. (See Figs. 2 and 3.)

The wedge-shaped piece 28 is pivoted by a pin $28^a$ (see Fig. 2) to a pivoted arm 29. (Also shown in Fig. 2.) To the top of this pivoted arm is pivoted a connecting-rod 30, having a handle 31, by which it is operated.

When it is desired to force the friction-disk 12 away from its contact with the disk $14^f$, all that is required is to pull the handle 31, and thereby force the wedge 28 forward, so as to force the link 6 out toward the pin $6^a$, (see Fig. 3,) thereby pushing the frame 8 (against the force of the spring 22) and all connected with it out away from the disk $14^f$.

From the above description it will be seen that by means of the handle 15 that portion of the friction-disk 12 which is in contact with the disk $14^f$ can be moved to or from the center of said disk, and it is obvious that the nearer it is brought toward the center of the disk the slower will be the motion imparted to said disk 12 and its accompanying pulley, and conversely the speed is increased as it is being moved from the center of the disk toward the periphery of the same. It will also be noticed that if the disk-wheel 12 is moved far enough to carry its frictional contact-face beyond the center of the disk $14^f$, or on the other side of the center, the motion will be reversed, and the reversed rotation of the disk 12 may then be varied just the same on the first-mentioned side of the center.

In Fig. 1 I have shown a portion broken away to show an opening 32 to allow the pulley 11 and disk 12 to pass down low enough for this purpose. This opening 32 is also shown in the plan view, Fig. 3. In place of this opening 32 the bearing for the disk 14, the disk, and pulley-shaft may be raised higher up or the frictional contact-face of the disk 12 be at the bottom or on the lower side of the disk $14^f$ by simply inclining it in the opposite direction and the same results obtained in the same way.

It will be further seen that the device can be moved and quickly set to run at any desired speed in either direction and held at that point by means of the handle 15, the curved notched bar $15^b$, and the spring-retaining pawl $15^c$.

I claim as my invention—

1. In frictional gearing, the combination, with two disks, the operative flat faces of which are unobstructed and at a slight angle to each other, and contact only on a line, the line of contact of one of the disks being always at the same distance from its center, while the line of contact of the other disk may be varied, of means for relatively moving said disks so that one may pass entirely across the face of the other one, whereby the speed and direction of the gearing may be changed at will, substantially as set forth.

2. In frictional gearing, the combination, with two disks, the operative flat faces of which are unobstructed and at a slight angle to each other, and contact only on a line, of means for moving one of the disks toward and away from and entirely across the face of the other disk, whereby they may be placed in or out of operative position and the speed and direction be changed at will, substantially as set forth.

3. In a frictional gearing, the combination, with a base, of a disk journaled thereon, a weighted frame pivotally secured to the base, a disk journaled in the frame at a slight angle to the other disk, and two handles, one of which moves the frame upon its pivot so as to move its disk entirely across the face of the other disk, and the other handle controls the mechanism for moving the frame laterally so as to move the disks into and out of contact with each other, substantially as set forth.

4. In a frictional gearing, the combination, with a base provided with a plane surface, of a shaft journaled in the base provided with a disk at one end, a link pivotally secured adjacent to the plane surface, a counter-weighted spring-controlled frame pivotally secured to the link, and provided with a curved surface adapted to engage with the plane surface, a shaft journaled in the frame, one end of which is provided with a disk which is adapted to be moved entirely across the other disk, and means for moving the disks into and out of engagement with each other, substantially as set forth.

5. In a frictional gearing, the combination,

with a base, of a shaft journaled therein, and a frame thereon a disk at one end of the shaft, a pin projecting from the base, a stop at the outer end of the pin, a weighted frame upon the pin, a spring for holding the frame away from the stop, said frames being each provided with a lug, a wedge between said lugs, a handle for moving the wedge between the lugs, a shaft journaled in the frame, a disk on the end of the shaft, at a slight angle to the other disk and adapted to be moved entirely across its face, and means for moving the frame, substantially as set forth.

6. In a frictional gearing, the combination, with a base, of a shaft journaled therein, a disk at one end of the shaft, a frame pivotally secured to the base, a shaft journaled therein, a disk on the shaft at a slight angle to and adapted to engage with and be moved entirely across the face of the other disk, a bar, and a handle secured to the frame and adapted to be secured to the bar, whereby the frame and its disk may be held at any desired position relative to the disk on the base, substantially as set forth.

BRITAIN HOLMES.

Witnesses:
JAMES SANGSTER,
ARTHUR J. SANGSTER.