

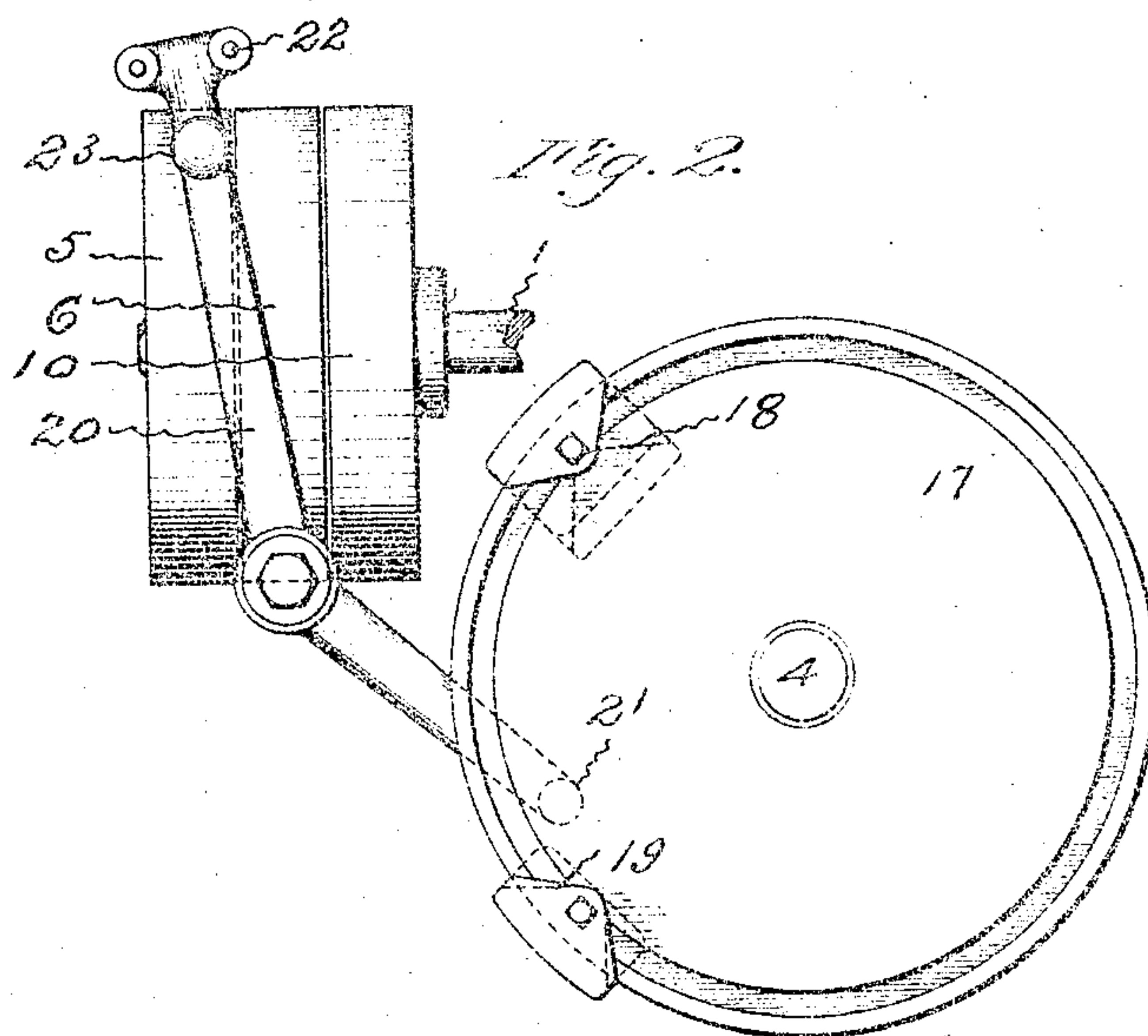
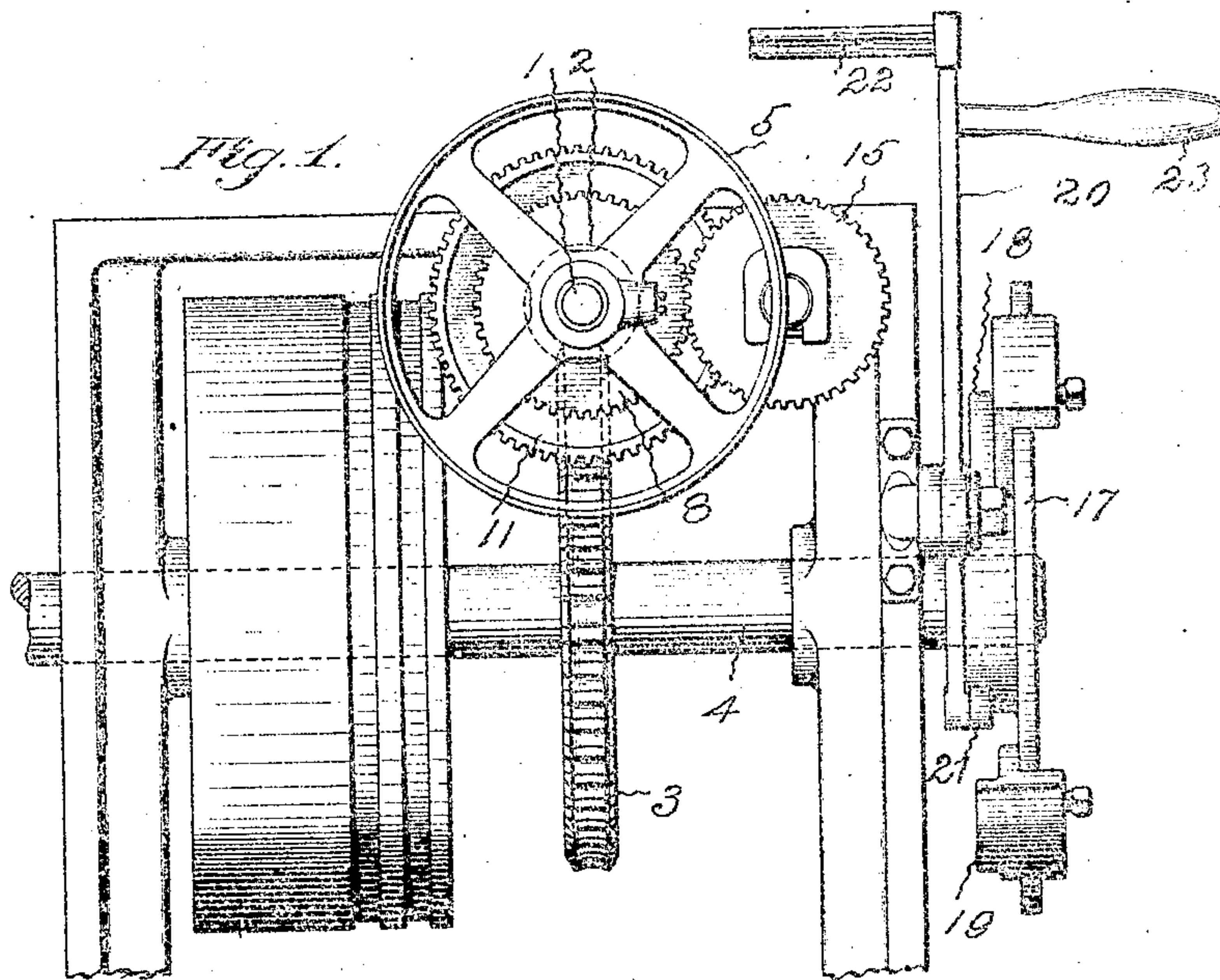
No. 848,606.

PATENTED MAR. 26, 1907.

C. M. SPENCER.
VARIABLE SPEED MECHANISM.

APPLICATION FILED MAR. 8 1906.

2 SHEETS—SHEET 1.



Witnesses.

C. F. Storey.

Ethel M. Lowe

Inventor:

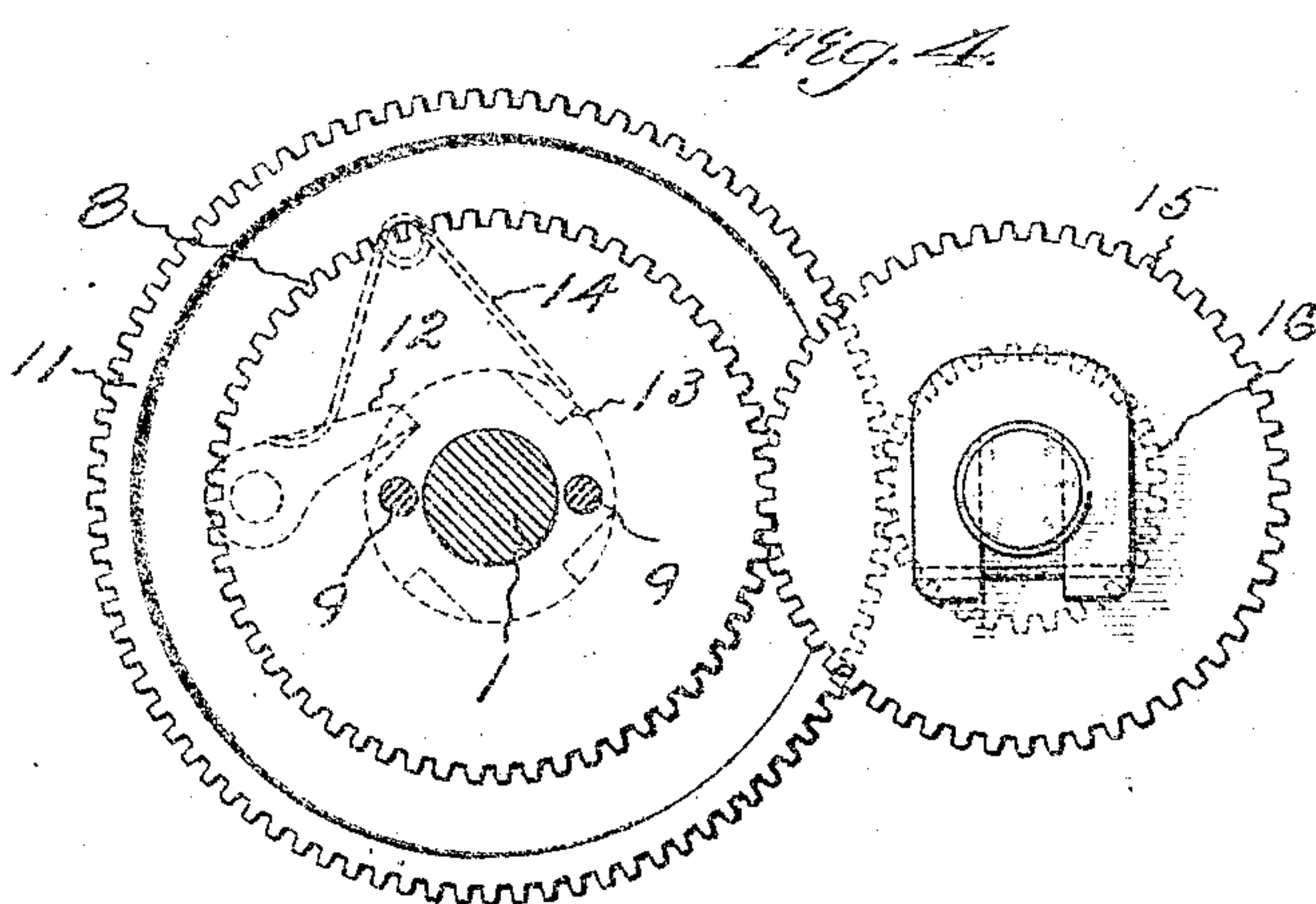
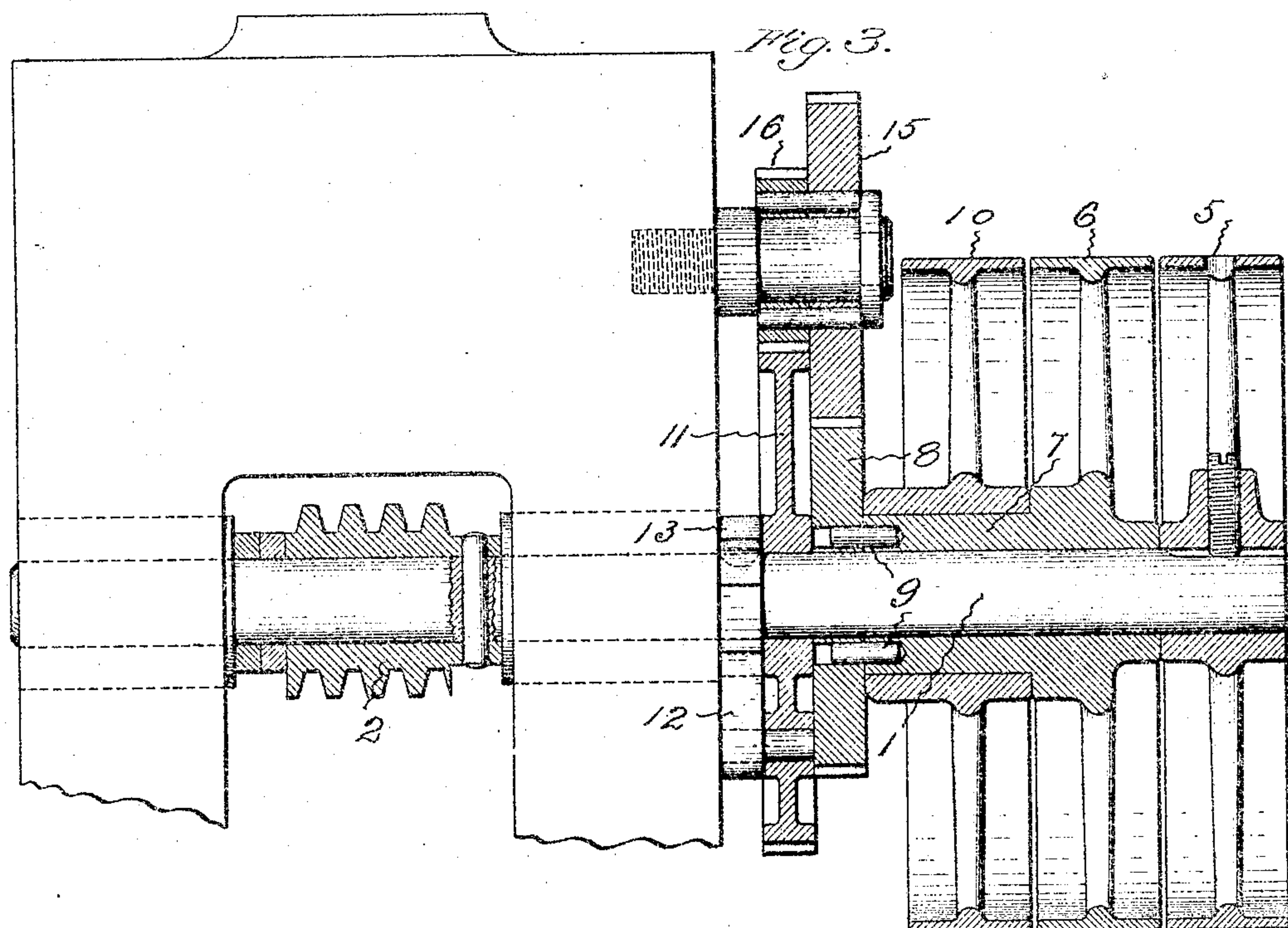
Christopher M. Spencer
per
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2 SHEETS—SHEET 2.



Witnesses.

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UNITED STATES PATENT OFFICE.

CHRISTOPHER M. SPENCER, OF WINDSOR, CONNECTICUT, ASSIGNOR TO THE
UNIVERSAL MACHINE SCREW COMPANY, OF HARTFORD, CONNECTICUT,
A CORPORATION OF CONNECTICUT.

VARIABLE-SPEED MECHANISM.

No. 848,606.

Specification of Letters Patent.

Patented March 26, 1907.

Original application filed May 4, 1904, Serial No. 206,277. Divided and this application filed March 8, 1906. Serial No. 304,839.

To all whom it may concern:

Be it known that I, CHRISTOPHER M. SPENCER, a citizen of the United States, residing at Windsor, in the county of Hartford and State of Connecticut, have invented a new and useful Variable-Speed Mechanism, of which the following is a specification.

This invention relates to a mechanism which is particularly designed for rotating the cam-shaft of an automatic multiple-spindle screw-machine—such, for instance, as is shown and described in my application for patent for automatic screw-machine, filed May 4, 1904, Serial No. 206,277; but it is also applicable to other machines in which it is desirable to at intervals change the speed of the driving-shaft.

The object of the invention is to produce a very simple mechanism by means of which the speed of a shaft—such, for instance, as the cam-shaft of a screw-machine—can be instantly greatly increased, as when the cutting-tools of such a machine are being drawn away from and fed up to the work, without necessitating the speeding up or driving rapidly of the gears which are employed to reduce the speed of the shaft, as when the tools are operating, thus saving power, reducing wear, and enabling the change to be accomplished quickly, and consequently allowing the speed of the machine to be increased.

It is very desirable in order to economize time to withdraw the tools from and advance them up to the stock rapidly and then to instantly slow down while the tools are cutting. This is accomplished with this mechanism by automatically sliding the belt by a belt-shifter operated by means of cams on the cam-shaft onto a pulley which drives the worm-shaft directly at a rapid rate and then at the proper time sliding the belt back onto a pulley which drives the worm-shaft indirectly through suitable gearing, the gearing being so connected with the shaft that it does not have to run as fast as the shaft when the shaft is driven directly.

Figure 1 of the accompanying drawings shows a front elevation of a portion of a screw-machine provided with a variable-speed mechanism which embodies the invention. Fig. 2 shows an elevation of the pulleys, belt-shifter, and shifter-operating cams. Fig. 3 shows a horizontal section, on larger

scale, through the pulleys and gearing. Fig. 4 shows a face view of the gears.

The worm-shaft 1 has a worm 2, which meshes with a worm-wheel 3 on the cam-shaft 4, which bears the cams which feed the tools toward and from the stock. The worm-shaft is supported by suitable bearings arranged in the bed of the machine in a common manner. On the front end of the worm-shaft is the high-speed pulley 5. This pulley is keyed to or otherwise fixed tight to the shaft, so that the rotation of the pulley will rotate the shaft and the worm directly. Loose on the shaft inside of the fixed pulley is the low-speed pulley 6. This pulley turns freely on the shaft and has a long hub 7, to which a gear 8 is removably attached by dowel-pins 9. This gear is fastened by pins in this manner so that it may be easily removed and one of different size substituted, if desired.

Turning loosely on the hub of the low-speed pulley is the loose pulley 10. When it is desired to have the mechanism remain stationary, the belt is slipped upon this loose pulley.

Turning loosely on the worm-shaft is a gear 11, which carries a pawl 12, and keyed or otherwise secured to the shaft adjacent to the pawl-gear is a ratchet 13. A spring 14 is arranged to hold the pawl against the surface of the ratchet which is keyed to the shaft.

On a stud that projects from the frame of the machine are gears 15 and 16. These gears turn loosely on the stud and are held together so as to act as one part by pins, so that they may be easily separated for changing their relative diameters if a different speed is desired.

On the end of the cam-shaft is a disk 17, and clamped on the periphery of this disk are two cam-blocks 18 and 19. Hinged to the frame adjacent to this disk is a lever 20, the lower end of which bears a roll 21, that is adapted to be engaged by the cam-blocks, and the upper end of which bears a fork 22, which is adapted to embrace the driving-belt. Extending from the lever is a handle 23.

When the cam 18 engages the roll 21, the lever is oscillated so that the fork guides the belt onto the low-speed pulley. When the

cam 19 engages the roll 21, the lever is so oscillated that the fork guides the belt onto the high-speed pulley. When it is desirable to have the mechanism stand idle, the lever
5 may be oscillated by hand so that the fork will guide the lever onto the loose pulley.

When the belt is on the loose pulley, the work-shaft remains idle. When the belt is on the low-speed pulley, the shaft is driven
10 through the gears and the pawl and ratchet. In this case the low-speed pulley through the gear which is pinned to its hub rotates the gears that are pinned together on the stud, the inner of which rotates the loose gear
15 bearing the pawl, which engages the ratchet that is keyed to the shaft.

When the belt is on the high-speed pulley, the shaft is driven directly, for that pulley is fastened to the shaft. In this case when the
20 shaft first commences to rotate at the high rate of speed at which the pulley runs the ratchet runs away from and rides under the pawl, so that it is not necessary to pick up and drive the gearing at the high speed.

15 In the mechanism which is illustrated the pulleys are designed to be driven at the same rate of speed and the gears are proportioned so that the difference in the rotations of the worm-shaft when driven by the high-speed
30 and the low-speed pulleys is as nine to one. If the low-speed gears were positively connected with the shaft, it would be necessary after the belt was shifted onto the high-speed pulley before the high speed could be realized

to get all of the gears rotating at high speed; 35 but with the ratchet-and-pawl connection which is shown this is unnecessary, for the ratchet runs away from the pawl, so that the inertia of the gears offers no resistance to the rotation of the worm-shaft at high speed. 40 On account of this the speed of the machine can be increased. The wear on the parts is much reduced, and more accurate work can be done because of the less wear and because the change of speed can be accomplished 45 quickly.

The invention claimed is—

A variable-speed mechanism having a worm-shaft, a pulley fixed to the worm-shaft, a pulley adjacent thereto and loose on 50 the worm-shaft, an idle pulley free on the hub of the loose pulley, a gear on the worm-shaft adjacent to and connected with the hub of the loose pulley, a gear loose on the worm-shaft, two gears fastened together on a paral- 55 lel shaft, one of said gears meshing with the gear that is connected with the hub of the loose pulley and the other of said gears meshing with the gear that is loose on the worm-shaft, a pawl carried by the gear that is 60 loose on the worm-shaft, and a ratchet fixed to the worm-shaft and engaged by the pawl, substantially as specified.

CHRISTOPHER M. SPENCER.

Witnesses:

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