

No. 780,642.

PATENTED JAN. 24, 1905.

W. W. EARL.  
SPEED CHANGING MECHANISM.

APPLICATION FILED OCT. 17, 1904.

2 SHEETS—SHEET 1.

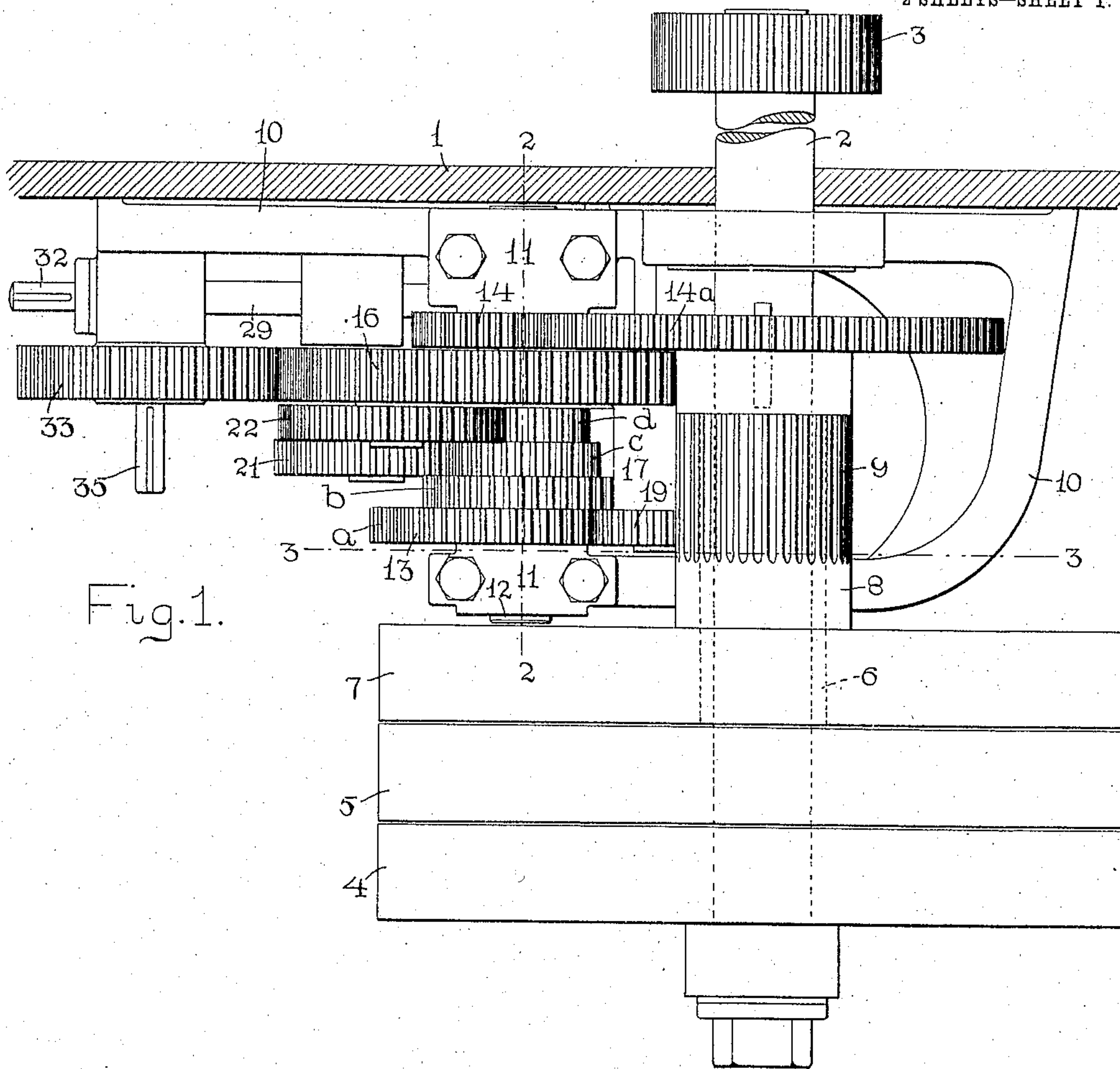
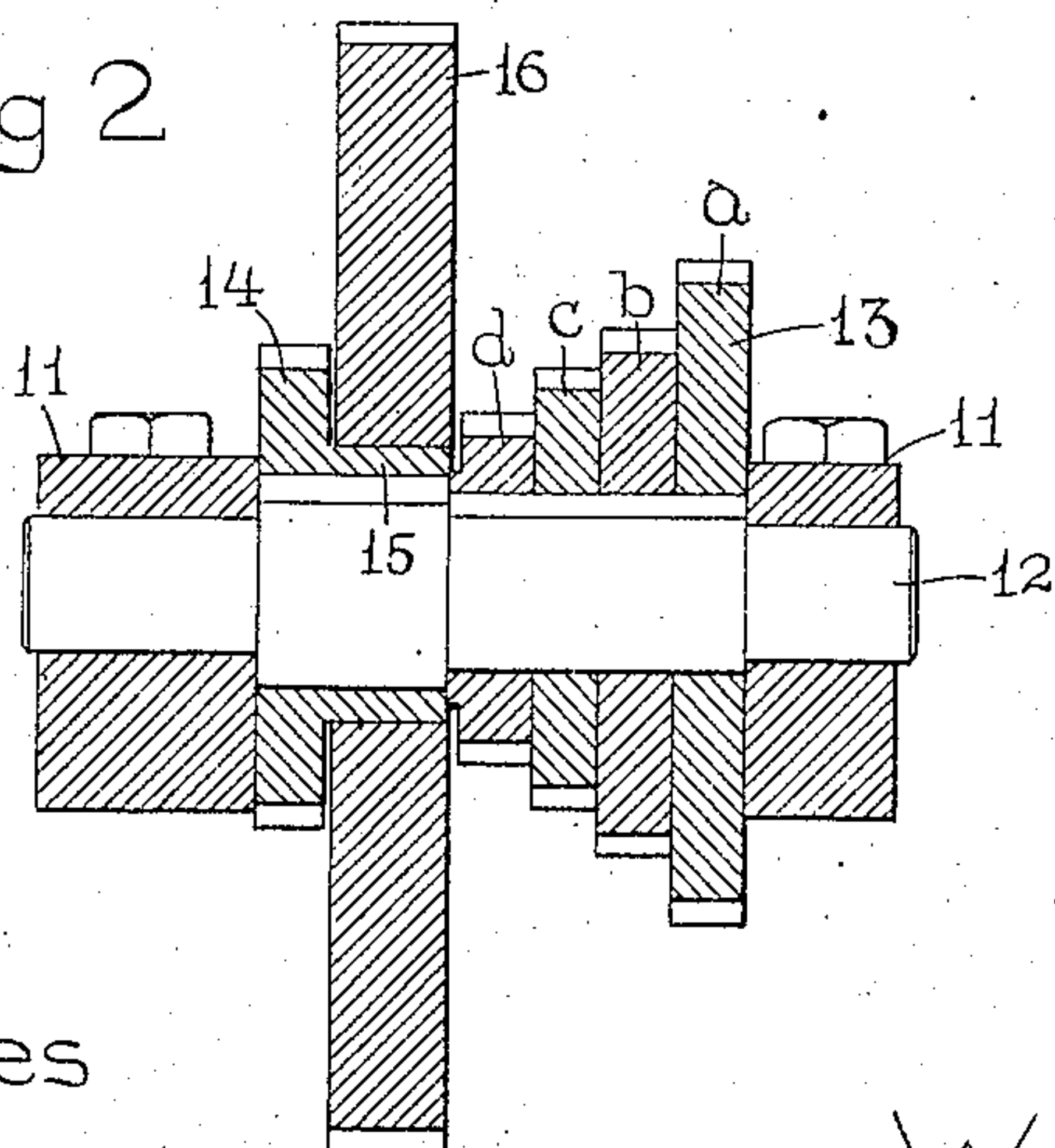


Fig. 1.

Fig 2



Witnesses

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Fig 3.

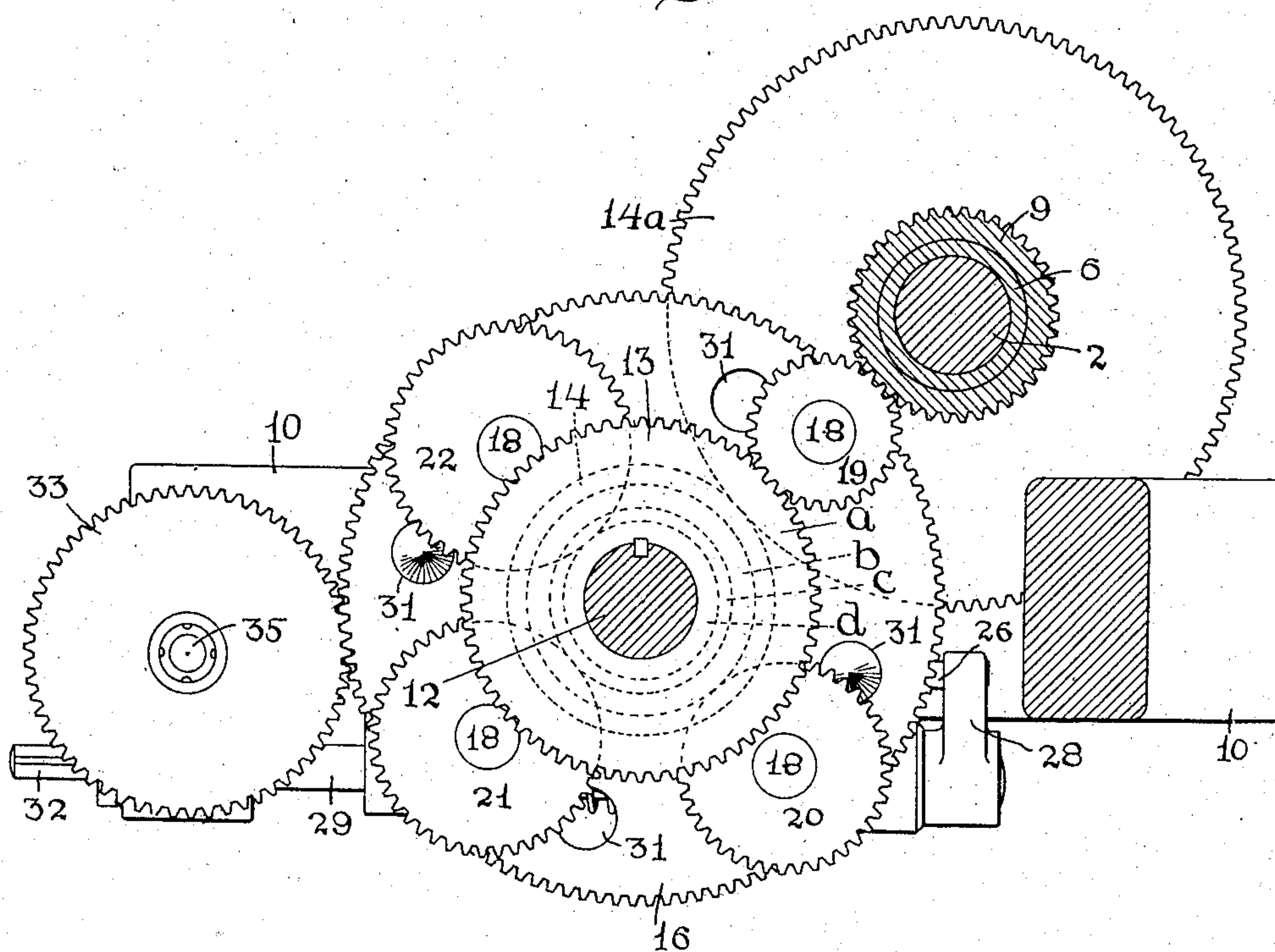


Fig. 4.

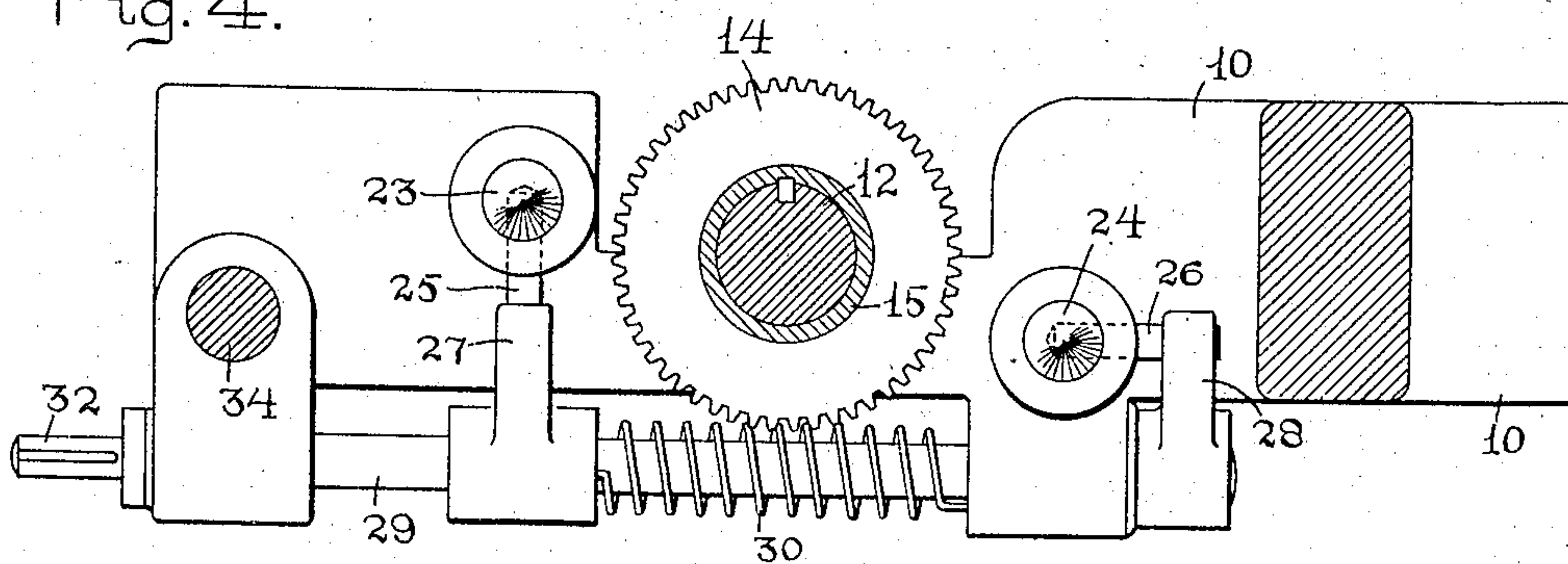
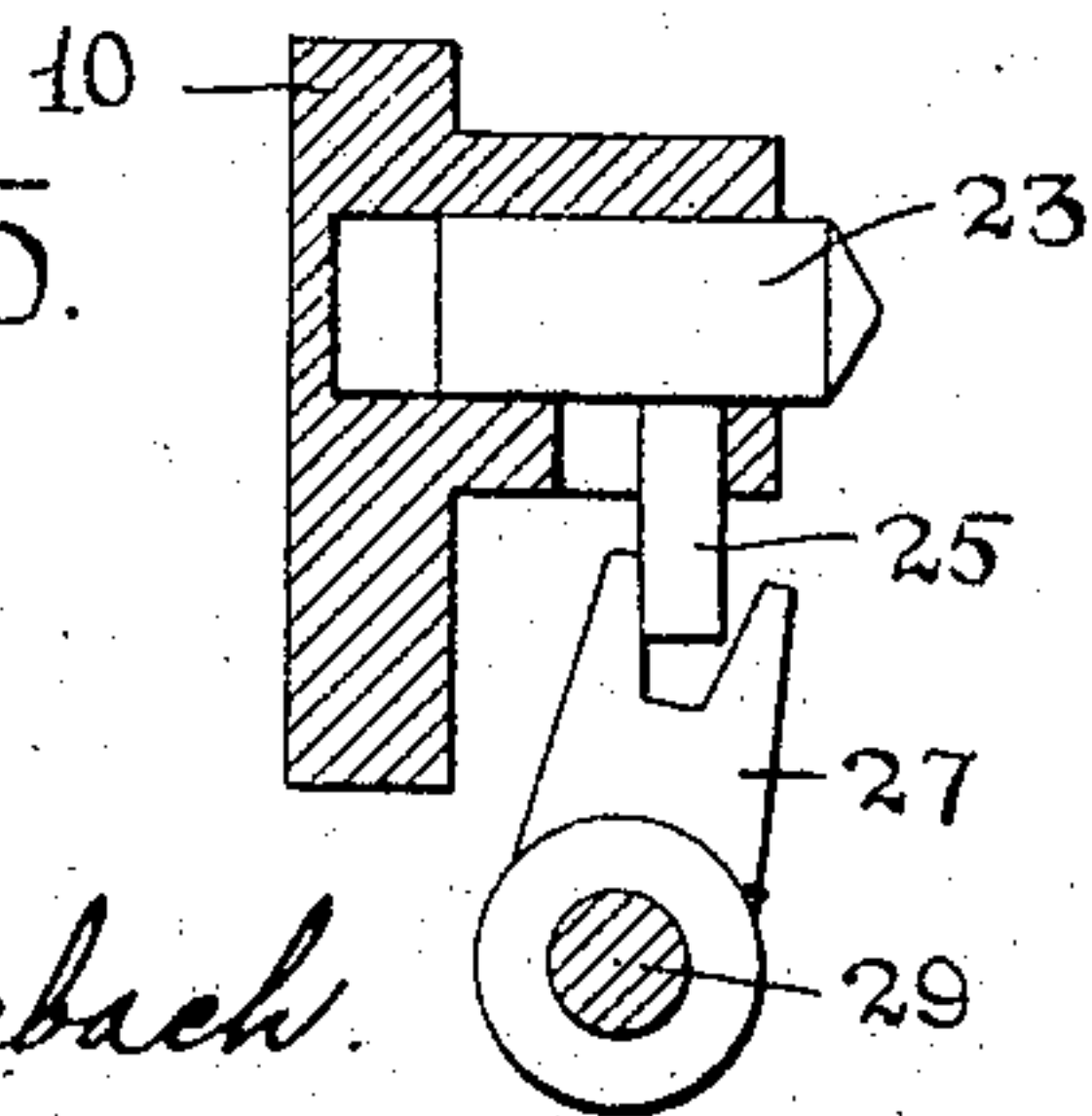


Fig 5.



Witnesses

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## UNITED STATES PATENT OFFICE.

WILLIAM W. EARL, OF WORCESTER, MASSACHUSETTS.

## SPEED-CHANGING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 780,642, dated January 24, 1905.

Application filed October 17, 1904. Serial No. 228,678.

*To all whom it may concern:*

Be it known that I, WILLIAM W. EARL, a citizen of the United States, residing at Worcester, in the county of Worcester and Commonwealth of Massachusetts, have invented a new and useful Improvement in Speed-Changing Mechanism, of which the following is a specification accompanied by drawings forming a part of the same, in which—

Figure 1 is a top view of a speed-changing mechanism embodying my invention. Fig. 2 is a sectional view on line 2 2, Fig. 1. Fig. 3 is a side elevation shown in sectional view on line 3 3, Fig. 1. Fig. 4 is a side elevation of that portion comprising the locking mechanism, and Fig. 5 is a detached view of one of the locking-pins and its actuated lever.

Similar reference letters and figures refer to similar parts in the different views.

My present invention relates to a speed-changing mechanism especially designed to be employed with the reciprocating table of a metal-planing machine, whereby the speed of the table on its cutting stroke may be varied at will, while the speed of the table on its return stroke remains constant; but my improved speed-changing device is likewise applicable to other classes of machine-tools.

Referring to the accompanying drawings, 1 denotes a portion of the bed of a metal-planing machine; 2, the main driving-shaft, carrying a pinion 3, adapted to engage a rack upon the under side of the planer-table in the usual and well-known manner in machines of this class, but not shown in the accompanying drawings. The outer end of the main shaft 2 is provided with a tight belt-pulley 4, a loose belt-pulley 5, and turning loosely on the shaft is a sleeve 6, to which is attached a tight belt-pulley 7, provided with a hub 8, which is provided with long gear-teeth, forming a pinion 9. The mechanism may be driven by the usual belt connection with a convenient driving-shaft and having the usual shifting mechanism by which the driven belt may be shifted at will from the loose belt-pulley 5 to either one of the tight pulleys 4 or 7. Attached to the side of the planer-bed 1 is a bracket 10, provided with bearings 11 11 for rotating

spindle 12, to which is keyed a cone-gear 13, having steps *a*, *b*, *c*, and *d*, and also a pinion 14, having a hub 15, upon which turns loosely a gear-plate 16, provided with four laterally-projecting hubs of varying lengths, one of which is shown at 17, Fig. 1. In the ends of the hubs are studs 18, on which turn intermediate pinions 19, 20, 21, and 22, said intermediate pinions being of different diameters and having their axes at different distances from the center of the gear-plate 16, so that they will intermesh with the steps of the cone-gear 13, intermediate pinion 19 meshing with the step *a*, pinion 20 with the step *b*, pinion 21 with the step *c*, and pinion 22 with the step *d*. By rotating the gear-plate 16 either one of the intermediate pinions 19, 20, 21, and 22 may be brought at will into mesh with the driving-pinion 9, so that the rotary motion of the pinion 9 will be imparted to the spindle 12. The speed of the spindle 12 will be varied relatively to the speed of the driving-pinion 9 as the different intermediate pinions 19, 20, 21, and 22 are brought into mesh with the driving-pinion 9 in proportion to the difference in diameter between the different steps *a*, *b*, *c*, and *d* of the cone-gear 13, and the rotation of the spindle 12 will be imparted to the main shaft 2 by means of the pinion 14, which engages a gear 14<sup>a</sup>, splined to the main shaft 2. The gear-plate 16 is held from rotation whenever any one of the intermediate pinions 19, 20, 21, and 22 are brought into engagement with the driving-pinion 9 by means of locking-pins 23 and 24, sliding in sockets in the bracket 10 and carrying radially-projecting studs 25 26, which are engaged by forked levers 27 and 28, attached to a rocking shaft 29.

The rocking shaft 29 is inclosed by a torsional spring 30, whose tension is applied to rock the shaft 29 to move the locking-pins 23 and 24 into holes 31 in the gear-plate 16. The end 32 of the rocking shaft 29 is adapted to receive a wrench, by which the rocking shaft may be turned against the tension of the spring 30 to withdraw the locking-pins from the gear-plate 16 and allow the latter to be rotated by a pinion 33, attached to a stud 34 and having



its outer end 35 adapted to receive a wrench, by which the gear 33 may be turned. When power is applied to the tight belt-pulley 4, the main shaft 2 and pinion 3 will be rotated at a constant speed, which may be employed to effect the return stroke of the planer-table; but when the belt is shifted from the tight pulley 4 across the loose pulley 5 to the tight pulley 7 the power will then be applied to the main shaft 2 through the driving-pinion 9, cone-gear 13, pinion 14, and gear 14<sup>a</sup>, the speed of the main shaft then being determined by the relative diameter of the step of the cone-gear 13 which is at the time engaged with the driving-pinion 9 through one of the intermediate pinions 19, 20, 21, and 22.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In a speed-changing mechanism, the combination with a supporting-frame and a main shaft, of means for rotating said shaft at a constant speed, a sleeve turning loosely on said shaft, means for rotating said sleeve at a constant speed, a pinion carried by said sleeve, a gear carried by said main shaft, and intermediate connecting-gears changeable at will, whereby the speed of said main shaft is varied relatively to the speed of said sleeve.

2. In a speed-changing mechanism, the combination with a main shaft, of a sleeve turning loosely on said shaft, means for rotating said sleeve, a driving-pinion carried by said sleeve, a driven gear carried by said shaft and speed-changing gears between said driving-pinion and said driven gear, and comprising a cone-gear operatively connected with said driven gear, a series of intermediate pinions of varying diameters, and means for bringing

any one of said intermediate pinions into mesh with said driving-pinion and said cone-gear. 40

3. A speed-changing mechanism, comprising a cone-gear, a driving-pinion and a series of intermediate pinions capable of being brought into mesh with said pinion and cone-gear, a gear-plate, means for rotating said gear-plate, 45 locking-pins for holding the gear-plate in any desired position, and means for withdrawing said locking-pins to release said gear-plate.

4. In a speed-changing mechanism, the combination with a main shaft, a pulley for driving the shaft, a sleeve rotating loosely on said shaft, a pulley for driving said sleeve, a driving-pinion on said sleeve, a driven gear on said shaft, a cone-gear, intermediate pinions engaging said cone-gear, means for bringing 55 any one of said intermediate pinions into mesh with said driving-pinion at will, a pinion operatively connected with said cone-gear and engaging the driven gear on said main shaft, whereby said main shaft may be driven either 60 at a constant speed by one of said pulleys or at a varied speed by the other of said pulleys.

5. A speed-changing mechanism, comprising a rotating gear-plate, a series of intermediate pinions carried thereby, capable of being brought into action by the rotation of said gear-plate, locking-pins slidable in sockets, a rocking shaft, arms carried by said rocking shaft to engage said locking-pins, a spring applied to said rocking shaft to carry said locking-pins into engagement with said gear-plate. 70

Dated this 10th day of October, 1904.

WILLIAM W. EARL.

Witnesses:

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