March 7, 1933. H. SUTER 1,900,776

CALCULATING MACHINE COMPRISING AXIALLY DISPLACEABLE SETTING WHEELS

Filed Sept. 24, 1931

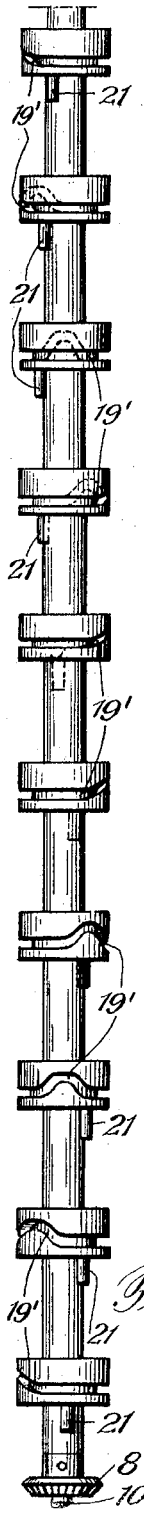

Fig. 5

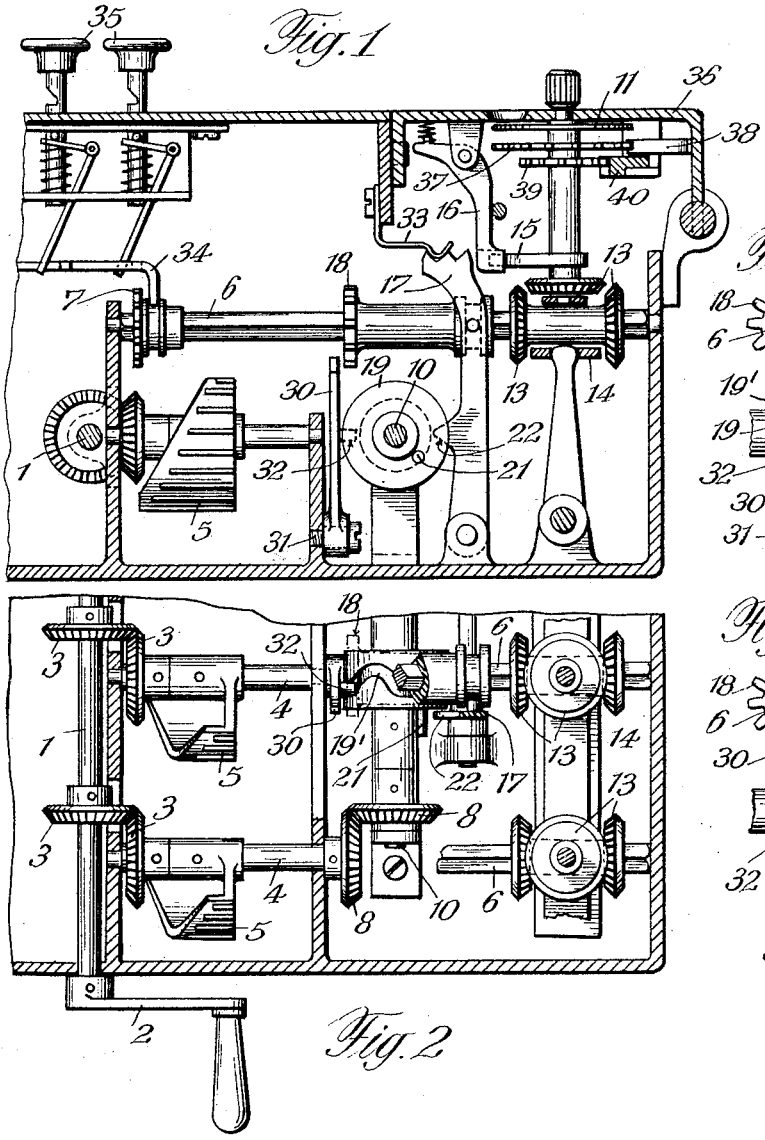

Fig. 1

Fig. 2

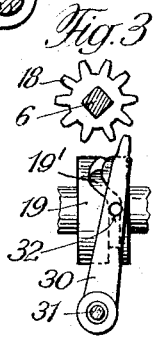

Fig. 3

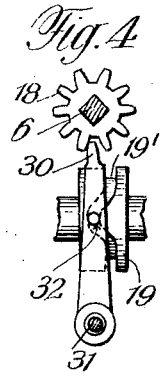

Fig. 4

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UNITED STATES PATENT OFFICE

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CALCULATING MACHINE COMPRISING AXIALLY DISPLACEABLE SETTING WHEELS

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Devices are known in calculating machines for transferring tens between adjacent number wheels, in which setting shafts having a polygonal cross-section are provided for the counting mechanism. These shafts are turned in only one direction and have setting wheels displaceably arranged thereon and cooperate with cylinders having teeth of graduated lengths about their circumference. These devices are shown, for example, in the well-known Thomas machines.

The object of this invention is the construction, in a calculating machine, of a rigid continuously operating shaft for transferring tens, which is adapted to cooperate with displaceable setting wheels, the shaft is provided with cam discs having cam grooves of such a shape that setting levers cooperating therewith and with spur gear teeth on their respective setting wheels are adapted to advance the same step by step.

This arrangement affords effecting substantial simplifications in the design of the machine while at the same time a continuous transferring of tens free of disturbances and with the aid of setting wheels having ordinary spur gear teeth is ensured.

In the accompanying drawing a constructional form of the device according to the invention for transferring tens in calculating machines is shown in connection with a Thomas machine, in which

Fig. 1 is a sectional elevation;

Fig. 2 is a sectional top plan view;

Figs. 3 and 4 show sectional views of details of Fig. 1 with the setting lever in operative and inoperative position respectively, and

Fig. 5 represents an elevation of the operating shaft for transferring tens on a larger scale.

Referring to the drawing, 1 denotes the driving shaft which is operable by means of a hand crank 2 or, alternatively, actuated by a motor (not shown) and which imparts its rotational movement to the shafts 4 by bevel wheel drives 3. Each shaft 4 is provided with a cylinder 5 about the circumference of which teeth of graduated lengths are arranged and with each of which a setting shaft 6 of a square cross-section and carrying an adjusting wheel 7 is correlated. The wheel 7 is engaged in a known manner by a control bar 34 which is displaceable by means of a row of keys 35. One of the shafts 4 positioned at one end of the machine drives by means of a bevel wheel drive 8 the operating shaft 10 for transferring tens, which enables influencing the number wheels 11 of the counting mechanism, arranged on the slide 36, for effecting the transfer of the tens. The slide 36 of the counting mechanism is provided with locking means 37, 38 for the number wheels 11 and the zero resetting device 39, 40. Each number wheel 11 is associated with a reversing drive 13 which is adjusted in a respective position for turning the number wheel in an additive or a subtractive sense, in a known manner, by means of a reversing bar 14. On the shafts of the number wheels 11 a setting finger 15 is arranged which is adapted to rock a swinging arm 16 on the slide 36 of the counting mechanism against spring action for transferring tens in a manner well known. Each arm 16 in turn rocks a control lever 17, whereby a setting wheel 18 coupled with the lever 17 of the next higher series of units and provided with normal spur gear teeth is shifted in the axial direction on the shaft 6, so as to enter in the path of the correlated setting lever 30. The control lever 17 is provided with two notches for cooperation with a leaf spring 33 which holds the control lever in its respective position of adjustment.

The setting levers 30 are individually mounted on bolts 31 and engage each in a peripheral guideway in the form of a groove in a control cam 19. The control cams 19 are secured to the operating shaft for transferring tens so as to be offset relatively to each other in the circumferential direction as regards a portion 19′ of the guide grooves of the cams (Fig. 5) which portion deviates from the general plane of the groove. This arrangement permits that in turning the operating shaft 10 the setting levers 30 engage consecutively in the respective setting wheel 18, which was moved out of inoperative po-

sition by action of related control lever 17, for advancing said wheels one step (Figs. 3 and 4). Upon completion of the tens transfer a stud 21 fixed to the cam 19 hits the nose 22 of the corresponding control lever 17 which thereafter together with the setting wheel 18 returns into the position shown in Fig. 1 and is secured therein by the leaf spring 33.

In the guide groove in the circumference of the control cams 19 the setting levers 30 are positively guided, so that the levers are prevented from advancing too far during the setting operation and deviations from their true paths and lost motion is avoided.

The device for transferring tens according to this invention is obviously adaptable to calculating machines having toothed racks instead of drums provided with axial teeth of graduated length.

I claim:

1. In a device of the type described, in combination, a setting wheel for each setting shaft slidably carried thereby, spur gear teeth provided on said setting wheels, a continuous rigid shaft for the transfer of tens of adjacent number wheels and common to all the setting wheels, a cam disc for each setting wheel provided on said common shaft, a guideway provided on said cam discs, setting levers cooperating with the guideway on related cam discs and adapted to consecutively advance said setting wheels one step by engagement with the spur gear teeth of the wheels.

2. In a device of the type described, in combination, a setting wheel for each setting shaft slidably carried thereby, spur gear teeth provided on said setting wheels, a continuous rigid shaft for the transfer of tens of adjacent number wheels and common to all the setting wheels, a cam disc for each setting wheel provided on said common shaft, a guideway provided on said cam discs, setting levers cooperating with the guide grooves in related cam discs, and a nose on each setting lever positively engaged by the guide groove in the related cam disc for adapting said setting levers to consecutively advance said setting wheels one step by engagement with the spur gear teeth on the wheels under avoidance of lost motion.

3. In a device for transferring tens between adjacent number wheels of a calculating machine of the type provided with polygonal setting shafts for the counting mechanism which are driven in only one direction of movement, in combination, longitudinally displaceable setting wheels slidably mounted on each shaft, spur gear teeth on said wheels, an operating shaft spaced from said setting shafts, a grooved cam on said operating shaft adjacent each setting shaft, an oscillatable member for each setting wheel driven by contact with the respective cam groove and adapted to cooperate with said spur gear teeth for consecutively advancing the setting wheels one step.

4. In a device for transferring tens between adjacent number wheels of a calculating machine of the type provided with polygonal setting shafts for the counting mechanism which are driven in only one direction of movement, in combination, longitudinally displaceable setting wheels on said polygonal shafts, an operating shaft positioned perpendicular to said polygonal shafts, grooved cams on said operating shaft adjacent said setting wheels, spur teeth on said setting wheels, oscillating members actuated by contact with the grooved cams, means for moving the spur teeth of said setting wheels into the path of said oscillating members, whereby said setting wheels will be advanced a single step.

In testimony whereof I have signed my name to this specification.

HEINRICH SUTER.