

Oct. 31, 1939.

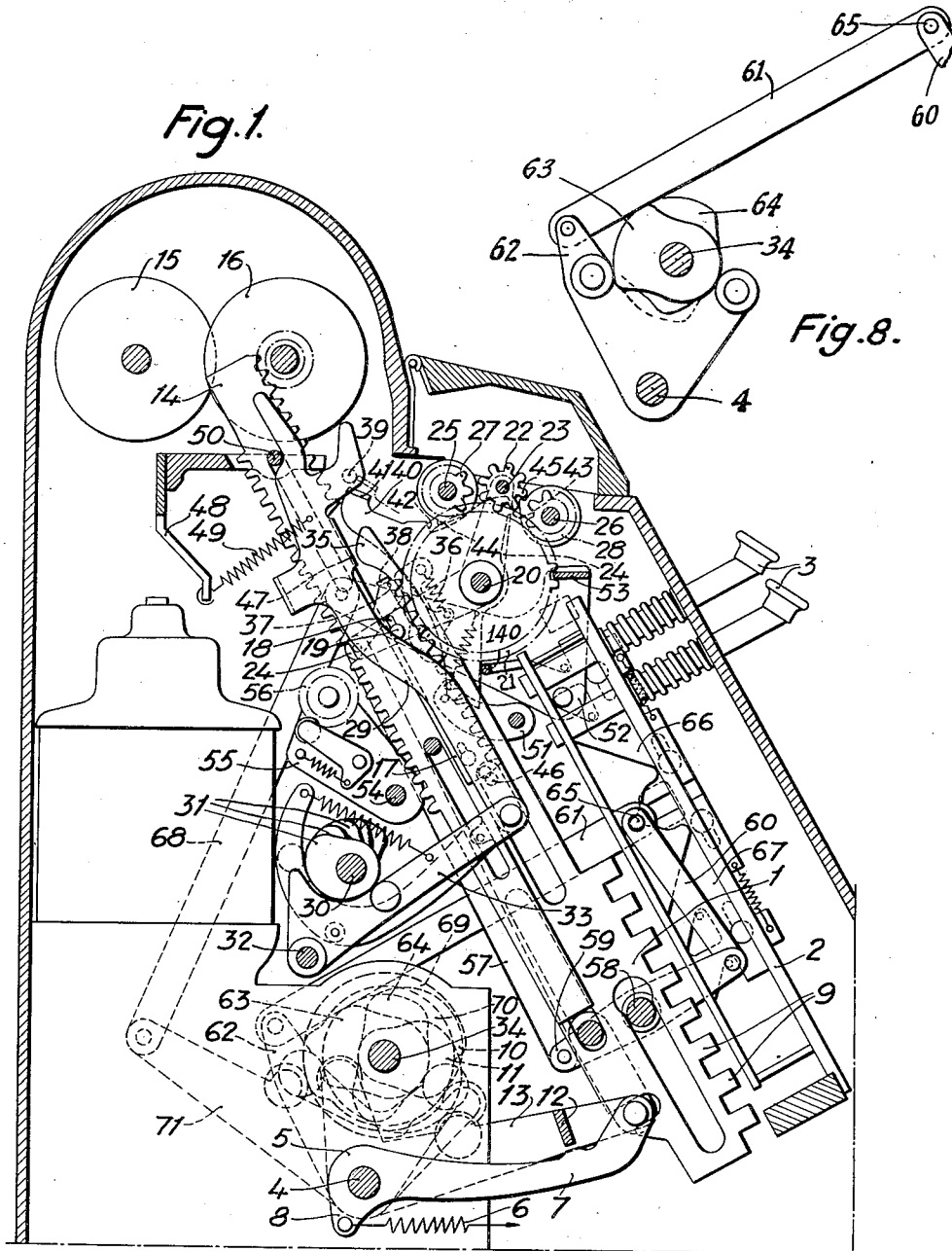
K. M. VIGBORG.

2,178,272

TENS TRANSMITTING DEVICE

Filed April 18, 1938

2 Sheets-Sheet 1



KARL MATTS VIGBORF
INVENTOR

134 Otto Munk
His Att'y.

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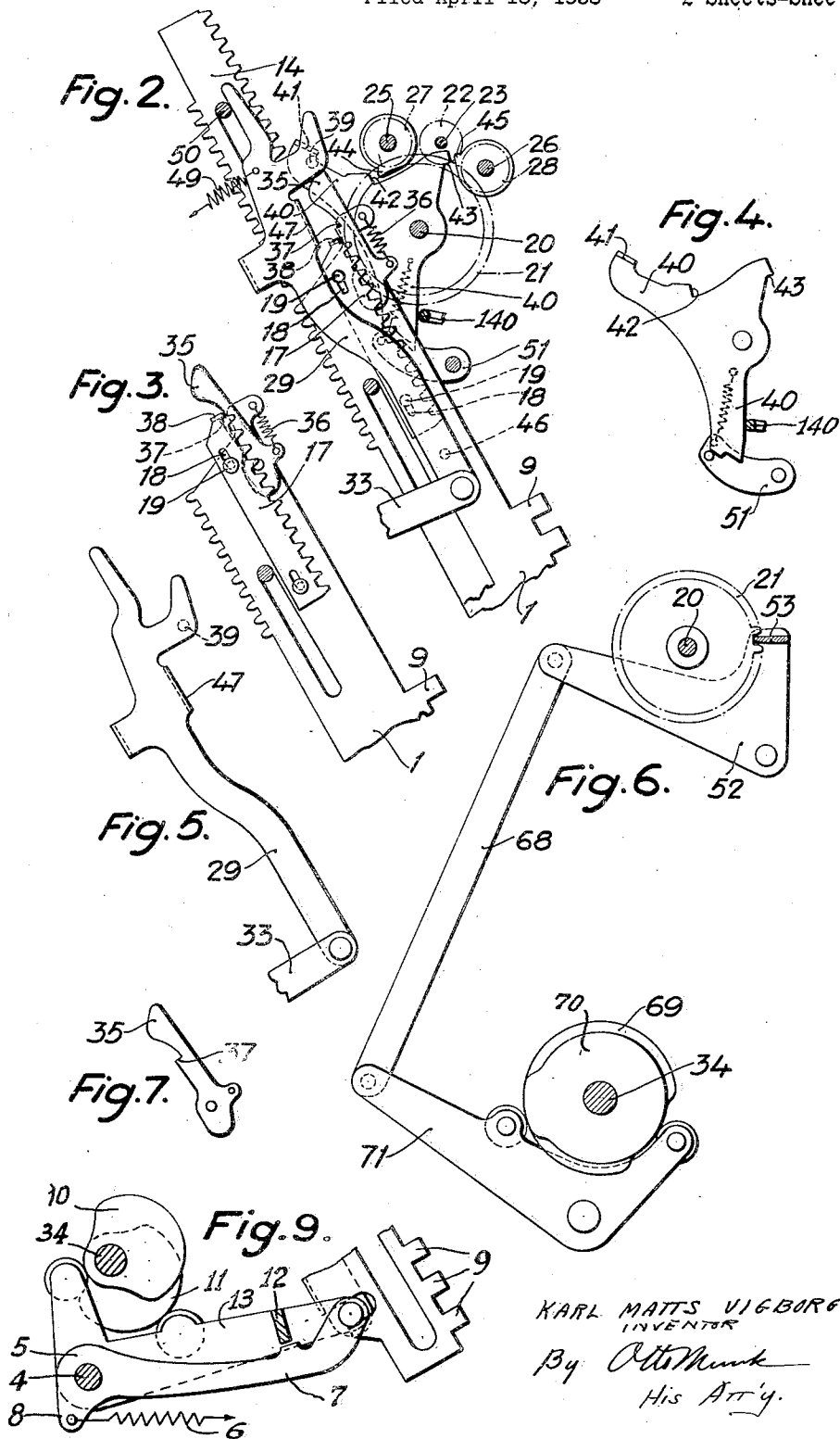
K. M. VIGBORG

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2 Sheets-Sheet 2



KARL MATTS VIGBORG
INVENTOR

By *Otto Munk*
His Att'y.

UNITED STATES PATENT OFFICE

2,178,272

TENS TRANSMITTING DEVICE

Karl Matts Vigborg, Stockholm, Sweden, assign-
or to Kooperativa Förbundet Förening u. p. a.,
Stockholm, Sweden

Application April 18, 1938, Serial No. 202,614
In Sweden April 21, 1937

6 Claims. (Cl. 235—133)

The present invention refers to an improved
tens transmitting device for calculating ma-
chines, cash registers and the like, and more par-
ticularly to a tens transmitting device for calcu-
lating machines and cash registers which are pro-
vided with totalizer actuating racks displaceably
mounted on a differential setting member and
in which a tens transfer is effected by means of
a relative displacement of a totalizer actuating
rack with respect to its differential setting
member.

One object of the invention is to provide a
tens transmitting device of simple construction
which works positively.

Another object of the invention is to produce
a tens transmitting device which holds the total-
izer actuating rack positively in a predetermined
position with respect to the differential setting
member, when no tens transfer is to be carried
out.

Still another object of the invention is to pro-
vide a tens transfer device, some parts of which
are devised and arranged to carry out a plurality
of operations, whereby the number of necessary
parts can be considerably reduced.

According to the present invention these and
other objects, which will appear more clearly
as the description proceeds, are accomplished by
the combination and arrangement of elements
described in the following specification, set forth
in the accompanying claims and illustratively
exemplified in the accompanying drawings, in
which

Figure 1 is a vertical section through the ap-
paratus.

Figure 2 shows the parts of the tens trans-
mitting device proper when assuming other positions
than those shown in Figure 1.

Figures 3-9 illustrate details.

In the drawings 1 indicates the differential
setting members, which are arranged for longi-
tudinal movements and provided with spaced
lugs 9. The lengths of these movements are de-
termined by keys 3 adapted to be depressed into
key banks 2 and locked therein. The upward
movements of the differential setting members
are effected by means of two-armed levers 5,
adapted to rock on a stationary shaft 4. One
arm 7 of each lever engages a differential setting
member and the other arm 8 is connected with
a tension spring 6, which tends to rock the arm
7 upwards, taking the associated differential set-
ting member along. One of the lugs 9 of each
setting member is then caused to cooperate with
one depressed key 3 and to stop the member

in a position corresponding to the amount en-
tered on said key. The longest movement of dis-
placement which can be performed by each of
the differential setting members corresponds to
the value nine. Two angle levers 13, one adja-
cent each side wall of the apparatus, are secured
on a rotatable shaft 34 and united by means of
a rail 12 (see Fig. 9). The angle levers 13 are
controlled by cam discs 10, 11 so as to rock back
and forth, whereby during each working stroke
of the machine, the rail 12 carries out an up-
and-down rocking motion corresponding to the
longest movement of displacement of the differ-
ential setting members 1. During the downward
movement of the rail 12 it takes along all the
differential setting members 1 and the arms 7,
respectively, adjusted by the keys 3 and return
the same and the differential setting members
to their home or neutral positions shown on the
drawings. To a revolving shaft 54 there are se-
cured arms 55, each carrying a coupling wheel
56. As shown and described in detail in U. S.
Patent No. 1,979,387, each differential setting
member 1 can be connected by means of the as-
sociated wheel 56 with the corresponding rack
14, which serves for driving indicators 15, 16 in-
dicating the amount entered on the keys. Fur-
ther, a totalizer actuating rack 17 is displaceably
mounted on each differential setting member 1
(Figure 3) by means of guide pins 19 secured
to the differential setting member and engaging
guide slots 18 in the totalizer actuating rack 17.

In each denomination, a toothed wheel 21
meshes with the totalizer actuating rack, and a
smaller toothed wheel 22 meshes with the toothed
wheel 21. All wheels 21 are arranged on a com-
mon stationary shaft 20 and all wheels 22 are
mounted on a common shaft 23, which is car-
ried by two angle levers 24, located one adjacent
each side wall of the apparatus and rockable on
the shaft 20. By shifting the levers 24 the
toothed wheels 22 may be brought into driving
mesh either with the totalizer wheels 27 mounted
on a stationary shaft 25 or with the wheels 28,
rotatably mounted on another stationary shaft
26, the said wheels 27 and 28 being located later-
ally of the wheels 21.

In order to obtain the shifting of the angle
levers 24, as above described, one end of a link
57 is pivoted to each angle lever 24, the other end
of said link being pivotally connected with one
arm of a two-armed lever 59, which is rockable
on a shaft 53, the other arm of the lever 59 being,
in turn, pivoted to one end of a link 60. With
the other end of the said link there is pivotally

connected one end of a link 61, the other end of which is connected with an angle lever 62 rockable on the shaft 4. By means of two cam discs 63, 64, which are secured to the rotatable shaft 34, the link 61 may be put into a reciprocating motion (see Fig. 8). The pin 65 uniting the links 60, 61 is adapted to cooperate with different guide members 66, 67, which are adjustable by means of keys and which are more particularly described in the U. S. patent application Serial No. 195,494, dated March 12, 1938, Figures 1-6, inclusive, and Figures 16 and 17, so that the arm 59 during the movement of the link 61 is rocked in one direction or the other, whereby the coupling wheels 22, by the rocking of the angle levers 24, enter into mesh either with the totalizer wheel 27 or with the totalizer wheel 28. The gear ratio between the totalizer actuating racks 17 and the totalizer wheels 27, 28, is, of course, so chosen that during the downward movements of the differential setting members the totalizer wheels are rotated a number of steps corresponding to the amount entered on the keys. Likewise, the lengths of the movements of the totalizer actuating racks relatively to the differential setting members is so adjusted that when, during a tens transmitting operation, a totalizer actuating rack is displaced relatively to its member 1, a rotation of one step is imparted to the totalizer wheel driven by said rack. The device effecting the abovementioned tens transmitting operation is constructed as follows:

Each differential setting member, with exception of that corresponding to the units totalizer wheel, has displaceably associated therewith a relatively lengthened part 29, serving as a tens transmitting member (Figure 5). With each such tens transmitting member there is united an angle lever 33 (Figure 1), all said levers 33 being mounted on a stationary shaft 32 and adapted to be put successively into an up-and-down rocking motion by a series of cam discs 31 secured in various angular positions to a rotatable shaft 30. Each differential setting member 1, with the previously mentioned exception, carries further rockably mounted thereon an arm 35 (Figure 7). When a differential setting member and its totalizer actuating rack assume their inoperative positions shown in Figures 1 and 3, a tension coil spring 36 fastened to the differential setting member 1 and to the arm 35 holds the latter in a position in which a lug 37 formed from the arm 35 (best visible in Figure 7) engages a lug 38 formed from the totalizer actuating rack 17 and prevents displacement thereof relative to the differential setting member. Each tens transmitting member 29 carries a projecting pin 39. The pin 39 is adapted to cooperate, in a manner described more particularly below, with a bent portion 41 formed from a plate 40 (Figure 4) swingable on the shaft 20. The plate 40 comprises, moreover, two cam surfaces 42, 43. The tens tooth 44 of the totalizer wheel 27 is adapted to cooperate with the cam surface 42, while the tens tooth 45 of the totalizer wheel 28 is adapted to cooperate with the cam surface 43. Each tens transmitting member 29 carries a pin 46, which is adapted to cooperate with the lower end of the totalizer actuating rack 17, and a lug 47, which is formed as a bent portion of the member 29. The lug 47 is adapted to cooperate with the upper surface of the bent portion 38 of the totalizer actuating rack 17. A tension spring 49, which is fastened between each tens transmitting member 29 and a fixed part 48, tends to keep

the member 29 in contact with a stationary guide pin 50 in the manner shown in Figure 1.

Two rockable arms 52 (Figure 6) only one of which is visible in the drawings, carry a rail 53. By means of a link or a bar 68 each of the arms 52 is united with an arm 71, which is rockably mounted on the shaft 4 and guided by cam discs 69, 70 secured to the shaft 34. During the rotation of the last mentioned cam discs the checking rail 53 will, alternately, be brought into and out of engagement with the teeth of the toothed wheels 21.

The device operates as follows:

After the desired amount has been entered on the keys 3 the machine begins its working stroke, during which the arms 33 perform an upward rocking movement. Then the differential setting members 1 are moved upwards and are adjusted to positions corresponding to the value of the amount entered on the keys. During the upward movement of the members 1, during which movement the rail 53 assumes inoperative position, the wheels 21 and 22 are rotated, but the wheels 22 not having yet been brought into engagement with any 27 or 28 wheels of the totalizers the latter remain in their positions. After the differential setting members 1 as well as the members 29 have reached their upper end positions, which, as regards the members 1, are determined by the keys, the rail 53 enters into engagement with the wheels 21 and about simultaneously the coupling wheels 22, by the rocking movement of the arms 24, are brought into rolling engagement either with the totalizer wheels 27 or 28. Now the rail 53 again frees the wheels 21 and by the downward movement of the rail 12, the differential setting members 1 are restored to their initial positions. If one of the totalizer wheels 27 or 28, which is driven in counter-clockwise direction by the wheel 22, has turned during this operation, from nine to zero, the tens transmitting tooth of the totalizer wheel in question actuates one of the cam surfaces 42 or 43, respectively, of the corresponding plate 40, whereby a rocking motion is imparted to the said plate. Each plate 40 cooperates with spring-actuated checking arm 51. Each plate 40 that has not been shifted is held by its checking arm 51 in a position in which its bent portion 41 is located laterally of the path of movement of the pins 39, which in this case is linear. (See dot and dash lines in Fig. 1.) After the members 1 have returned to their initial positions and before the toothed wheels 22 have left their driving mesh with the totalizer wheels the arms 33 begin to perform a downward rocking motion. Yet, this motion is not simultaneous for all of the arms, but it takes place successively, beginning with the arm responding to the lowest denomination, as the cam discs pertaining to the successive denominations are angularly offset relative to one another (see Fig. 1). If, now, the units totalizer wheel has previously shifted the corresponding plate 40 to the position shown in full lines in Figure 1 in which said plate rests with its rear face against an abutment 140 and the checking arm 51 is depressed (see Figs. 1 and 4), the pin 39 of the member 29 corresponding to the tens wheel will hit the upper surface of the bent portion 41. As a result the member 29, during its further downward movement, will be swung away from the guide pin 50 against the action of the spring 49. Simultaneously the bent portion 41 of the member 29 hits first the arm 35 and moves the same aside out of locking engagement with the

bent portion 38 of the totalizer actuating rack 17. Thereafter the lower edge of the portion 47 hits the upper side of the lug 38 whereby the totalizer actuating rack is taken along to the position shown in Figure 2. During the relative displacement between the totalizer actuating rack and the differential setting member the tens totalizer wheel, which is in engagement with the toothed wheel 22 driven by wheel 21, has been turned one step through the last mentioned wheels. If the tens tooth of the said tens totalizer wheel has previously shifted or shifts now the corresponding plate 40 the above described mode of operation is repeated, when the arm 33 responding to the hundreds totalizer wheel performs its downward rocking movement. Thus, the transmitting of tens proceeds gradually from one denomination to the next one in the above indicated manner. After a transmitting operation has been accomplished, the parts assume the positions shown in Figure 2. The spring 49, when the pin 39 has just passed the portion 41, has again pulled the member 29 into contact with the guide pin 50. The arm 35 is still held out of locking engagement with the totalizer actuating rack by one edge thereof resting against the bent portion 38. The toothed wheels 22 now leave their mesh with the totalizer wheels and about simultaneously therewith the rail 53 enters into engagement with the toothed wheels 21. Thus, one working stroke has been accomplished.

As is clear from the foregoing the checking rail 53 is held out of engagement with the toothed wheels 21 both during the upward and during the downward movement of the differential setting members 1. Only when the levers 24 during their rocking motion roll the coupling wheels 22 into engagement with the said totalizer wheels, are the toothed wheels 21 held fixed in their various angular positions by the checking rail 53 then being in engagement with the toothed wheels 21. Thus, an unintentional relative shifting of said wheels cannot possibly take place. The totalizer wheels, when they are out of driving mesh with the coupling wheels 22, are always held checked in their different positions by means of the usual checking members (not shown) and thus cannot perform any unintentional rotation. Thus, the device will work positively and more reliably than other more complicated devices known hitherto.

At the beginning of the next working stroke of the machine the arms 33, in the abovementioned manner, begin to perform an upward rocking motion. During such operation the pins 39 will cooperate with the lower surfaces of the portions 41 of those plates 40, which assume the position shown in Figure 2. On account of the guide pin 50 the pins 39 of the members 29, during this cooperation, will return the plates 40 to the positions which they assumed prior to the transmission. During the continued upward rocking motion of the arms 33 the pin 46 of the members 29 will hit the lower ends of the shifted totalizer actuating racks 17, thus taking the racks 17 along and restoring them their initial positions. When this has been accomplished the arms 35 return to their checking positions and with their lugs 37 engage again the underside of the lugs 33. By the above described operation taking place at the beginning of the working stroke, the plates 40 are returned to their initial positions before the next totalizing operation is started.

In the above described device the totalizer actuating racks 17 are held locked in their positions

relatively to the differential setting members, except when tens transmission takes place, whereby a very reliable operation is obtained. Another factor which also contributes to the positive mode of operation of the device is that the pin 39 of each tens transmitting member, by cooperation with one and the same lug 41 on the plate 40, during its displacement in one direction effects shifting of the respective plate 40 and during its displacement in the opposite direction causes the tens transmitting member to perform a movement that is transmitted to the totalizer actuating rack. By this double operation the number of parts is, moreover, reduced. The positive returning of the totalizer actuating racks after effected tens transmission also means considerable technical progress over heretofore known devices of the kind in question, in which the said returning of the totalizer actuating rack had to be effected by springs. The possibility of making such provision that, by a simple change of the shapes of the plates 40, the latter are made suitable also for apparatus of other constructions than the one shown on the drawings is a further important advantage.

Several embodiments and modifications may, of course, be devised within the scope of the invention.

Having now described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In a calculating machine having in each denomination a totalizer carrying a tens transfer tooth, a differential setting member and a totalizer actuating rack mounted on and displaceable with respect to said setting member, the combination of a movable catch to normally lock each actuating rack positively in a predetermined position relative to its setting member, and for each denomination above the unit denomination a tens transmitting device comprising a displaceable tens transmitter, means to reciprocate said tens transmitter, and a movable guide plate adjustable by the tens transfer tooth on the totalizer of the next lower denomination to an operative end position, said guide plate being shaped to guide, in said operative position, said tens transmitter during its stroke in one direction out of its normal path of reciprocation first against said catch to release the same and then against said actuating rack to displace the latter relative to its setting member whereby a tens transfer is effected.

2. A machine, as claimed in claim 1, in which said tens transmitter carries means to restore, during its return stroke, the displaced actuating rack to said predetermined position relative to said setting member.

3. A machine, as claimed in claim 1, in which said tens transmitter is shaped and arranged to adjust, during its return stroke, said guide plate from said operative end position to a second end position outside of the normal path of reciprocation of the tens transmitter.

4. A machine as claimed in claim 1, in which said tens transmitter consists of an elongated part displaceable longitudinally of the setting member, said part carrying two lugs disposed on either side, respectively, of the end faces of said actuating rack and adapted to alternately cooperate with said end faces, and a pin arranged for cooperation with said guide plate.

5. A machine, as claimed in claim 1, in which said actuating rack is provided with a lug and

said locking catch includes a spring and an arm pivoted to the setting member and controlled by said spring, said arm having a projection normally engaging said lug on said actuating rack
5 to hold the latter in said predetermined position, and being provided with a cam face shaped and disposed to be acted upon by said tens transmitter during displacement thereof in said one direction along said guide plate in its operative
10 position, so as to swing said arm away from said

rack thereby disengaging said projection from said lug.

6. A machine, as claimed in claim 1, in which said guide plate is pivoted on a fixed fulcrum and includes an abutment to be acted upon by said
5 tens tooth, and a guide face disposed, in said operative position of said plate, at an oblique angle to the normal path of reciprocation of said tens transmitter.

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