

2,012,121

3 Sheets-Sheet 1

FIG. 1A.

84

42

130

131

132

FIG. 1B.

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Aug. 20, 1935.

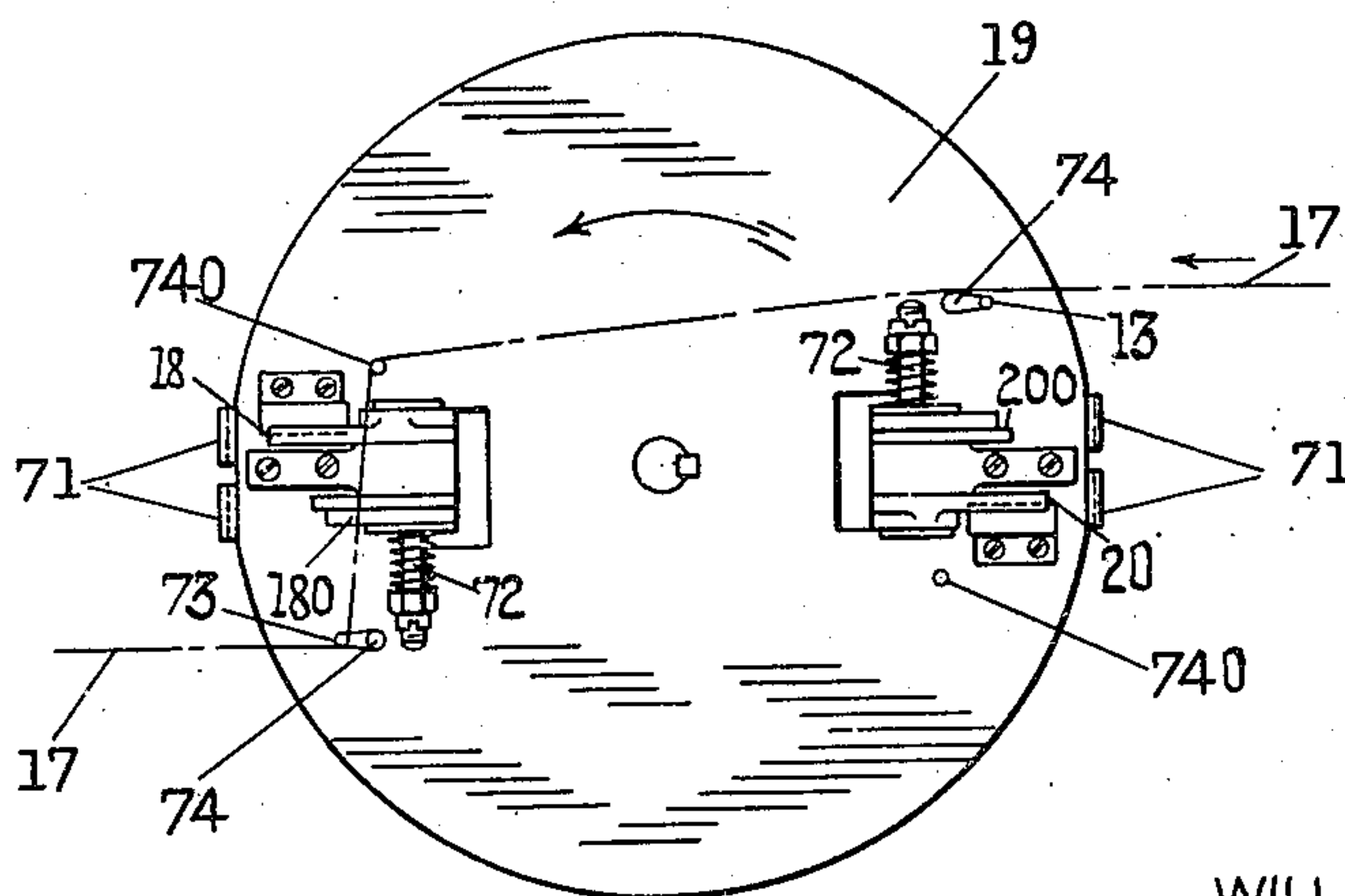
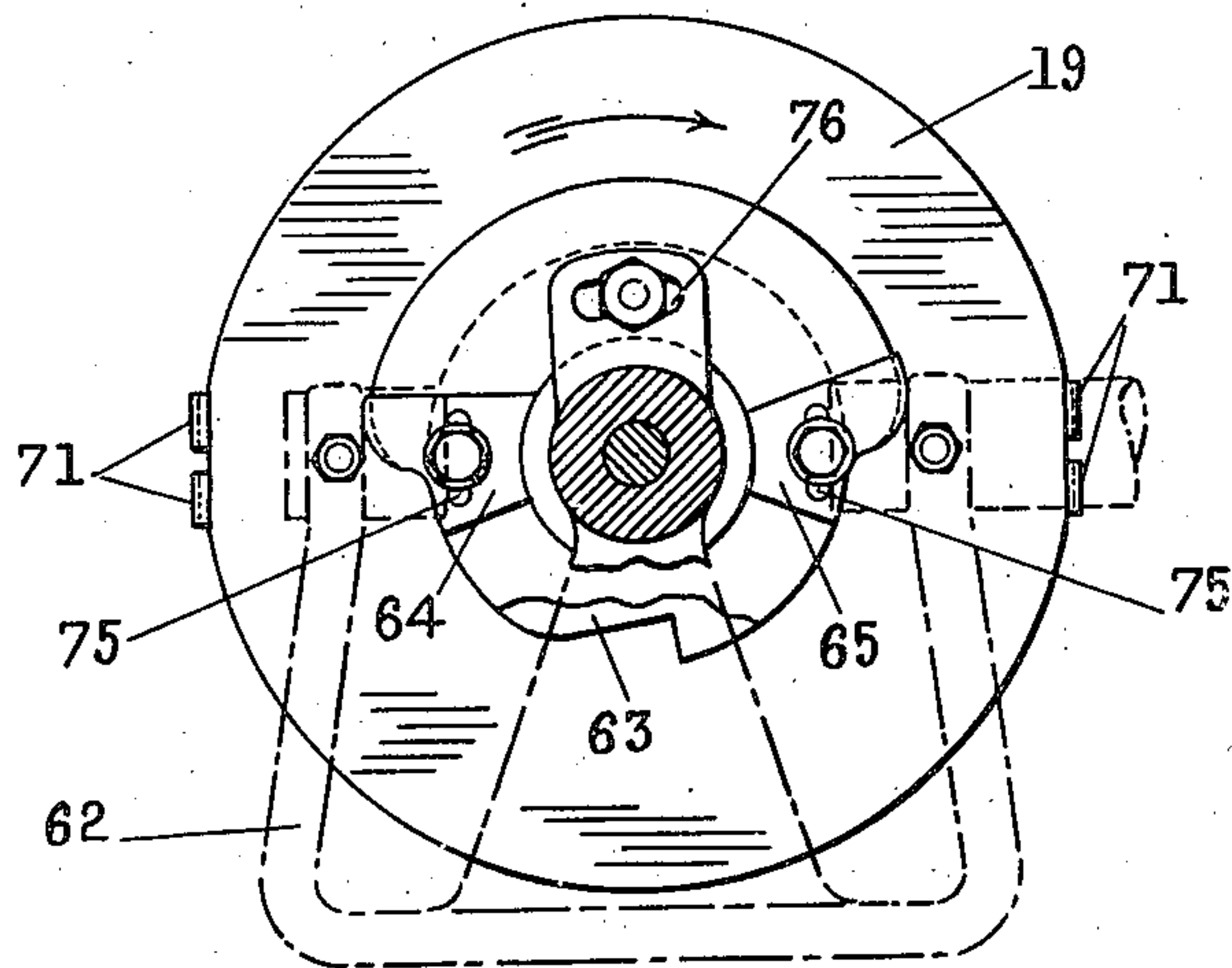
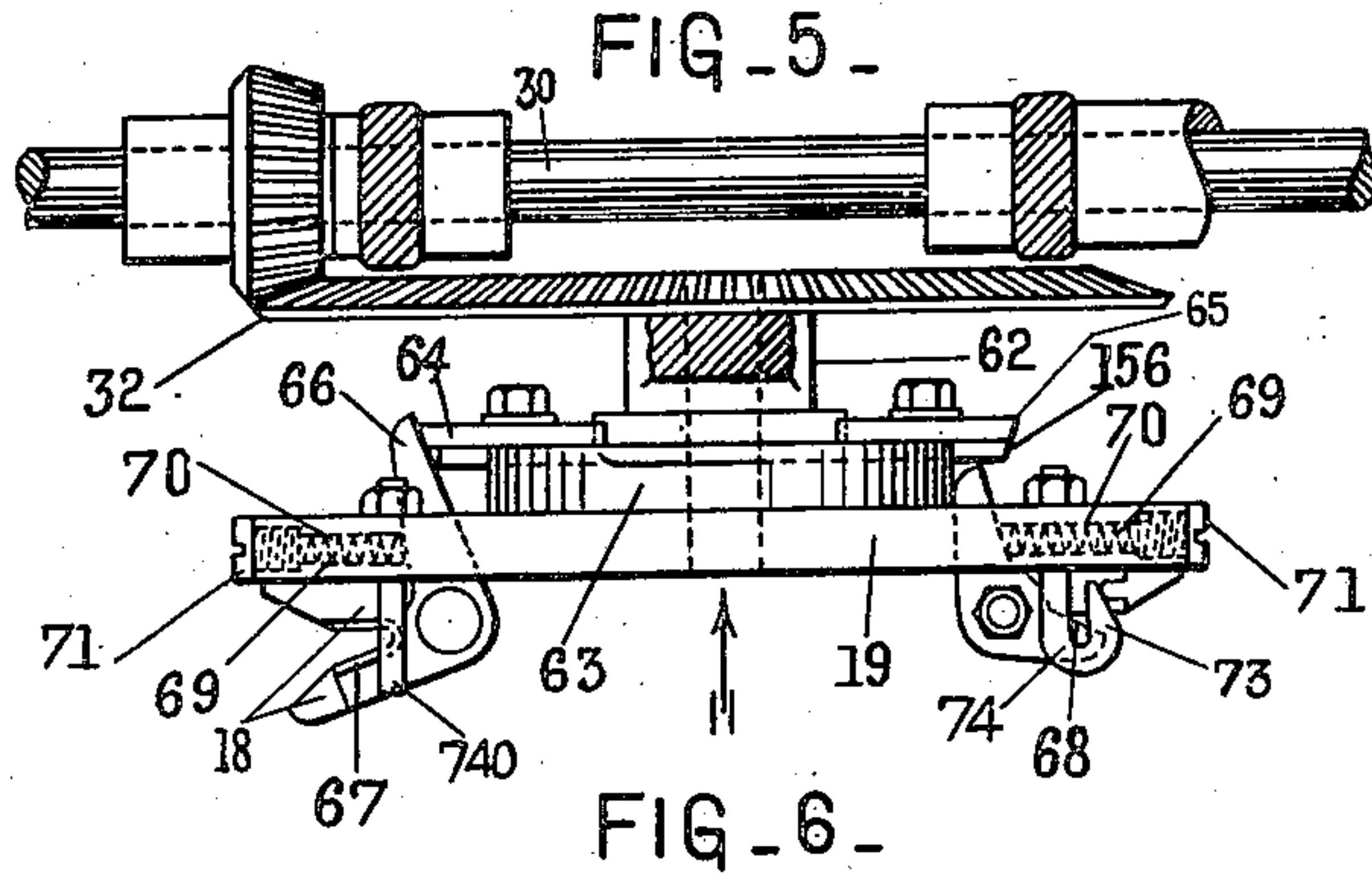
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SHUTTLELESS LOOM

Filed Sept. 27, 1930

3 Sheets-Sheet 2



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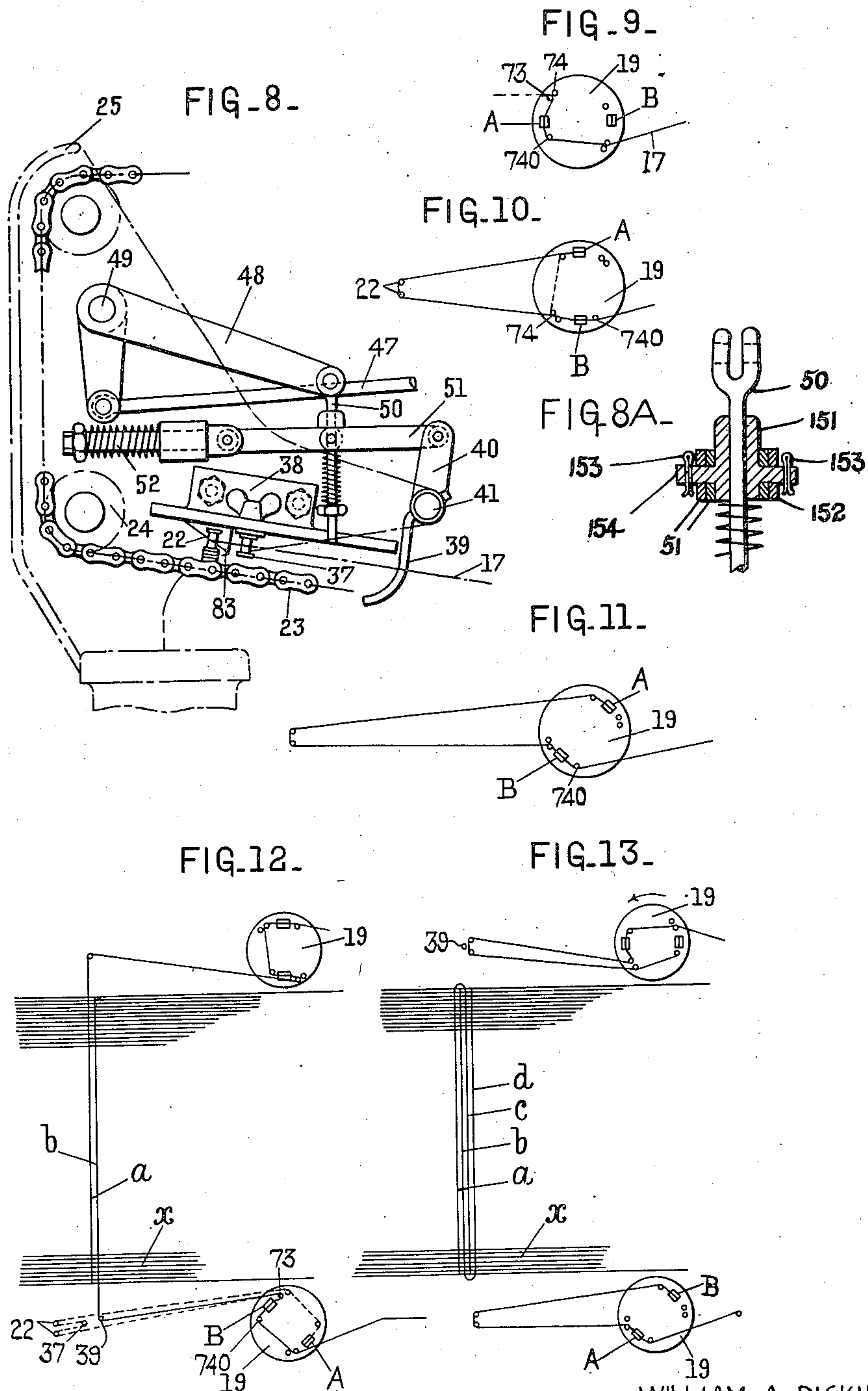
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SHUTTLELESS LOOM

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3 Sheets-Sheet 3



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2,012,121

SHUTTLELESS LOOM

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to Celanese Corporation of America, a corpora-
tion of Delaware

Application September 27, 1930, Serial No. 484,785
In Great Britain October 23, 1929

20 Claims. (Cl. 139—126)

This invention relates to shuttleless looms and in particular to an improved method of inserting weft in such looms by forming a measured loop at a side of the loom, which loop is then inserted
5 into the warps.

According to the invention, the weft-measuring apparatus comprises movable trapping devices adapted successively to take up a position in which weft trapped in one of the devices can
10 be drawn into a loop for insertion into the warps. For the insertion of weft in the form of "hair-pins" each limb of which lies in a separate shed, the weft loop is drawn of sufficient length for two picks. The subsequent description refers
15 more particularly to the formation and insertion of weft-loops of such length.

After the formation of the weft-loop the weft is trapped by the second of the devices, and released from the first. The bight of the loop
20 is brought into the vicinity of the path of any suitable weft-inserting means during the formation of the loop, and the limb of the loop extending from the first device is presented to the inserting means and carried into the warps.
25 When the second limb of weft, i. e., the one now extending from the second device is to be inserted (which may be on the pick next after that at which the first limb was inserted, or after the insertion of weft from another loop on the same
30 or the other side of the loom) the limb is severed near the second device between the device and the bight of the loop and the limb is presented to the inserting device.

After insertion of the two picks, the weft end
35 is, of course, now held by the second trapping device, and the trapping devices again take up a position in which a further weft loop can be formed in a similar manner to the first, the loop forming member being either the same as
40 that used to form the first loop or one of a number of members operating in sequence.

Where, as is generally most suitable, only two trapping devices are employed, the arrangement of the trapping devices after the formation of
45 one loop is the same as at the commencement of the operation, with the exception that the first device (A) is in the position previously occupied by the second device (B), and the weft end is held by the device (B). The further
50 movement of the devices causes the weft to be engaged by the device (A).

Conveniently, the trapping devices follow a circular path to cause the weft to pass between a pair of the devices, and may be mounted on a
55 member which is caused to rotate so as to im-

part the required movement to the devices. The movement of the trapping devices may take place simultaneously and may be continuous, at the same speed or otherwise, or intermittent.

Severing of the weft loop after it has been
5 trapped to the trapping device which for the time being is nearer the yarn supply may be effected by a single cutting device mounted in suitable fixed relationship to the trapping device and actuated to detach the weft loop from
10 the yarn supply before the second limb of the loop is to be shot into the shed. Alternatively, severing devices may be associated with each of the trapping devices and carried with them during their movement. Each severing device
15 may be independently actuated, but, since each device is only required to cut the weft when its respective associated trapping device is brought to one definite position with respect to the weft proceeding from the yarn supply, a single ac-
20 tuating means may be provided to engage and operate each severing device when the severing device occupies this position.

The actuation of the trapping devices may be most simply effected by the movement of the
25 devices from one position to another, as, for example, by the use of a fixed cam or cams which are encountered by the devices and trap and release the weft at the required points in the cycle of operations. The cam or cams may be
30 adjustable in order to regulate the operation of the trapping devices. Where severing devices are associated with the trapping devices, they may be actuated in a similar manner to the trapping devices.
35

The loop-forming means may be of any convenient form, it being preferred to use two or more devices for engaging the weft in turn, so that while a loop is being formed by one device, a second device is moving into position in readiness for forming a further loop. Thus, for ex-
40 ample, an endless band or chain may be arranged to traverse a path in proximity to which the weft loops are to be formed and pegs, rollers, hooks, or other members on the band or chain
45 engage the weft between the two trapping devices. Similarly, one or more oscillating or reciprocating hooked arms or rods may be used for the same purpose.

In order to ensure that the weft is properly en-
50 gaged by the trapping devices, these should be maintained a distance apart which does not substantially exceed that required for the uninterrupted passage of the loop-forming means.

Adjustment of the loop length in accordance 55

with changes in width of the fabric to be woven may be effected by changing the traverse of the loop-forming means with respect to the trapping devices. It is, however, more convenient to adjust the position of the trapping devices themselves on the loom, and where the devices are mounted on a rotatable member, movement of this member is sufficient to adjust the loop length and does not interfere with the distance between the trapping devices, this distance remaining the same whatever the length of loop being made.

It will be understood that it is not practicable to present the weft to the inserting device close to the edge of the warps, and, therefore, the first length of weft inserted has to extend over the width of the fabric and cover the distance between the edge of the fabric and the point of presentation of the weft. Consequently, a greater length of weft has to be available for the first insertion from the loop than for the second. The second pick then consists of the length of weft in the remainder of the loop plus the length extending from the edge of the fabric.

In order to provide for the difference in the lengths of weft required between the two insertions, a finger or hook is provided to engage the weft loop some distance from the bight of the fully-drawn loop, the finger or hook retaining the loop on withdrawal of the loop-forming means and allowing the weft engaged by the inserting means on the first pick to be greater than the length of one limb of the loop.

The position of the finger or hook just mentioned may be adjusted in accordance with the required difference in the weft lengths. It is, however, preferred to use subsidiary means for making this adjustment, which means may themselves be capable of adjustment with respect to the loop-forming means in order to provide for changes in the weft length difference occasioned by the weaving of different widths of fabrics. These means are most conveniently arranged in such a manner that the loop size adjustment is effected by the act of drawing the loop.

The finger or hook which is inserted in the weft loop is arranged to maintain tension on the first pick, and may be locked in position during beat-up. If, however, the movement of the trapping devices is such that extra tension is imparted to the second limb of the loop while it is still trapped by one of the devices, the finger or hook may be arranged to move against spring action to avoid straining the weft. Finally, the finger or hook is withdrawn to release the weft for the insertion of the second pick.

Weft-inserting means such as a shuttle-like member, or rigid or flexible members engaging the weft lengths and carrying them either right through the shed or part way through the shed and then transferring them to similar rigid or flexible withdrawing members, may be used for laying the weft. Similarly, weft-laying means such as the weft-carrier handed across the shed as described in U. S. Application S. No. 410,675 filed November 30, 1929 may be used.

Any convenient means may be provided for actuating the loop-forming mechanism during the operation of the loom and for presenting the weft lengths at the required intervals to the inserting means. The cycle of operations will vary according to whether weft loops are formed on one or both sides of the loom, and also according to the order in which weft is inserted in cases when more than a single loop is formed. Assum-

ing that the loom is arranged to receive weft from one loop only, the cycle of operations occupies two picks. When weft is to be inserted from both sides of the loom, as is most convenient when using a dummy shuttle as weft inserter, it is preferred to insert weft from each side alternately; the weft-laying cycle then occupying four picks.

The invention will now be described in greater detail by way of example with reference to the accompanying drawings in which:—

Fig. 1 is an elevation of the side of a loom equipped with the device from which several parts have been omitted for the sake of clearness;

Figs. 1A and 1B are two elevation views of a detail of Fig. 1;

Fig. 2 is a plan view of Fig. 1;

Figs. 3 and 4 are plan and section respectively of a detail to be referred to later;

Figs. 5, 6, and 7 are elevation, part plan and inverse plan respectively of the weft trapping and severing means;

Fig. 8 is an elevation of the left-hand section of Fig. 1 to an increased scale;

Fig. 8A is a detail in part section of Fig. 8; and

Figs. 9, 10, 11, 12 and 13 are diagrams illustrating different stages of the operations of forming the weft loops and inserting the weft into the warps.

Referring particularly to Figs. 1 and 2, weft is shown as being supplied from a stationary package 15 and led over a guide 16 to one of a pair of trapping devices 18, 20 mounted on a rotatable platform 19. The platform 19 moves so as to cause the thread 17 to pass between the jaws of the device 20 at a point between the device 18 and the guide 16, so that the thread extends between the two trapping devices.

The thread 17 is then engaged between the two devices 18, 20 by pegs 22 mounted on a constantly moving chain 23 passing over guide sprockets 24 arranged on supporting brackets 25, 26 mounted on the loom frame.

The platform 19 and the chain 23 are driven from the crankshaft 27 of the loom. Spiral gears 28 drive the shaft 29, which in turn drives a shaft 30 through spiral gears 31, this shaft 30 driving the platform 19 through bevel gears 32. A further pair of bevel gears 33 driven by the shaft 30 drive through spur gears 34 a shaft 35 on which is mounted a chain sprocket 36.

The run of the chain 23 between the lower guide sprockets 24 on the brackets 25, 26 is parallel to the platform 19 and the pegs 22 extend from the chain sufficiently to engage the weft between the two devices 18, 20.

Since the end of the thread 17 is secured in the device 18 while the thread is free to slide through the device 20 the movement of the pegs 22 draws the thread along the side of the loom in the form of a loop. The bight of the loop thus formed is engaged by a further peg 37 mounted on the bracket 25, which peg passes between the two pegs 22 and causes the bight of the loop to be doubled back, as shown in Fig. 2. The peg 37 is adjustably mounted in a small bracket 38 affixed to the bracket 25 and may be moved parallel to the run of the chain so that the extra length of weft drawn in the loop by the doubling back can be varied in accordance with changes in the width of the fabric.

A finger 39 is adapted to be inserted in the loop after the passage of the pegs 22 and is operated by a rocking arm 40 pivoted at 41 on the bracket 25. The movement of the finger 39 is obtained from a cam 42 rotating at twice the

speed of the platform 19. The cam 42 is mounted on a shaft 130 lying parallel with the shaft 30 and is driven at the required speed by gears 84. As will be seen from Figs. 1A and 1B the short shaft 130 carrying one of the gears 84 and the cam 42 is carried by a bracket 131 from the loom frame 132. The cam 42 actuates a spring-loaded bell-crank lever 43 having a bowl 44 running on the cam, the lever 43 being mounted on a bracket 46, and connected at 45 to a rod 47 connected to one arm of a bell-crank lever 48 pivoted at 49 on the bracket 25. The other arm of the lever 48 is connected by a spring-loaded link 50 to two toggle bars 51 one of which is connected to the rocking lever 40, and the other to a spring-loaded slide rod 52. As shown in Fig. 8A the link 50 carries a block 151 abutting against a block 152 provided with a pair of trunnions 154 on which the toggle bars 51 pivot. Split pins 153 hold the bars 51 in place on the trunnions.

When the finger 39 is first inserted into the loop by the cam 42, the toggle bars 51 are in line with the slide rod 52 and thus prevent any movement of the finger 39. Tension is therefore maintained on the first pick of weft which has been inserted from the loop. The cam 42 then releases the bars 51 so that the finger 39 is free to move against the pull of the spring on the link 50 under the tension exerted on the weft by the continued movement of the platform 19. Finally, the cam bowl 44 meets a quick drop in the cam 42 and allows the spring 430 to rock the lever 43 so as to withdraw the finger 39 suddenly out of contact with the weft just before the insertion of the second pick.

The loop of weft is released from the pegs 22 as the pegs pass round the lower sprocket 24 in the bracket 25 and the loop is presented a limb at a time into the path of a dummy shuttle or other weft inserter by means of a depresser 53 pivotally mounted on the slay 54 at 55 and connected at 56 to a rod 57 operated by a bell-crank lever 58 from a cam 59 engaging with a cam bowl 60, the cam being mounted on a shaft 61 which is driven by suitable means (not shown) from the crankshaft 27. The first limb of the loop is immediately below the depresser 53 while the second limb is clear of it. When the first limb has been presented, however, the second limb passes directly to the finger 39 and then lies close to the line of the first pick and below the depresser 53 so that it is presented in its turn. The finger 39 maintains the second pick in line below the depresser 53 thus insuring engagement of the pick by the depresser, and moves to allow for the continued rotation of the platform 19.

A guard 80, shown to increased scale in Figs. 3 and 4, is provided between the run of the thread 17 and the path of the chain 23, the guard being cut away as shown by 81 for the passage of the depresser 53. A slot 82 passes along the full length of the guard 80 so as to afford a passage for the member connecting the pegs 22 to the chain 23. The guard prevents contact of the thread with the chain and is particularly useful when the thread consists of cellulose acetate or similar easily electrified material likely to be attracted to metallic parts of the apparatus.

An inclined guide 83 behind the peg 37 prevents fouling of the thread on the peg as the thread is pulled past the peg on insertion of the first pick.

Figs. 5, 6, and 7 show the platform 19 to an increased scale. The platform 19 is carried in a bracket 62 on the loom frame and is driven by

bevel wheels 32 from the shaft 30. A member 63 is fixed to the bracket 62 and carries on its upper surface a cam 156 adapted to operate the trapping devices 18, 20. The timing of the cam 156 is adjusted by means of plates 64, 65 having slots 75. The edge of the cam 156 acts on an arm 66 of the movable jaw 67 of each trapping device, the arm 66 sweeping round the cam as the platform 19 rotates.

The periphery of the member 63 is formed as a cam, as shown in Fig. 6, serving to operate the movable knives 68 of severing devices 180, 200 associated with the trapping devices 18, 20 respectively. The timing of the cam 63 is adjusted by the slot connection 76. Springs 69, secured in holes 70 in the platform 19 by the screws 71 bear on the members 67, 68 and press them against their respective cams. The movable and fixed members of the trapping and severing devices are pressed together by springs 72 on their common pivot pins.

As the platform 19 rotates, the thread 17 is first engaged by the bevelled part 73 of a hook 74 and is carried into the hook so that it is properly guided between the jaws of the trapping device in which it is to be engaged. Pegs 740 are also provided to guide the thread through the trapping and severing devices. As the weft is drawn into a loop, it bears against the inner side of the part 73 of the hook 74 and so remains between the jaws of the severing devices in readiness for cutting.

The position of the platform along the shaft 30 determines the length of the loop. By suitable provision for adjustment of the bracket 62 the platform 19 can be moved along the shaft 30 so that a greater or smaller length of weft is drawn from the supply 15. The peg 37 is also adjusted to compensate for the variation in the distance between the edge of the fabric and the finger 39 consequential on the change of fabric width. It will be seen that the engagement of the thread by the trapping devices, and also the engagement of the thread between the devices by the pegs 22 are unaffected by the position of the devices along the shaft 30.

The operation of the apparatus will now be described with particular reference to Figs. 9, 10, 11, 12, and 13, in which the associated pairs of trapping and severing devices 18, 180 and 20, 200 are represented by the letters A and B.

In Fig. 9, the thread 17 is shown with its end trapped in the device A and the hook 74 just engaging the thread. In Fig. 10, the dotted lines show the manner in which the weft has been caused to extend between the devices A and B, and the full lines a partly drawn loop, the thread now running through the open jaws of the device B.

Fig. 11 shows the loop almost fully drawn, and the peg 740 guiding the thread through the device B.

In the lower part of Fig. 12, the pegs 22 have passed the peg 37, the form of the loop being shown in dotted lines. The finger 39 is shown as having entered the loop, and the first pick *b* has been inserted from the loop into the warps *x*, a previous pick *a* inserted from a similar measuring device at the other side of the loom also being shown. The trapping device at B has closed on the thread and the part 73 of the hook 74 still guides the remaining limb of the thread between the jaws of the severing device at B so that the second pick can be severed from the supply on withdrawal of the finger 39 in readiness for inser-

tion in the warps. The finger 39 in the position shown is now freed by the toggle bars 51 so that it can move as the continued rotation of the device B tends to increase the tension of the thread.

5 The finger is withdrawn just prior to insertion of the second pick, and until it is withdrawn retains the second pick substantially in the same line as that formerly occupied by the first.

Fig. 12 shows how the device B has moved into the position occupied previously by the device A, the position of the platform 19 having carried the device B just beyond the positions occupied by the device A in Fig. 9. The weft forming cycle, consisting of two picks of weft from each side of the loom, is thus completed, and the devices A and B proceed through the next, each performing the function previously carried out by the other.

A further pick c from the other side of the loom is shown inserted in the warps in Fig. 13 and followed by the second pick d connected to the pick b. The thread has now been severed so that the trapping device at B now holds the end of the thread. Further weft loops are shown being formed on each side of the loom.

25 What we claim and desire to secure by Letters Patent is:—

1. Weft measuring apparatus for shuttleless looms, said apparatus comprising two movable trapping devices adapted each to move into the position previously occupied by the other, and successively to take up a position in which weft thread trapped in one of said devices can be drawn into a loop to be presented for insertion into the warps.

35 2. Weft measuring apparatus for shuttleless looms, said apparatus comprising a rotatable member, and trapping devices mounted on said member, said member being adapted by its rotation to cause weft thread trapped in one of said devices to extend between two trapping devices, so that the weft can be drawn into a loop to be presented for insertion into the warps.

45 3. Weft measuring apparatus for shuttleless looms, said apparatus comprising a member rotatable in one direction only, and trapping devices mounted on said member, said member being adapted by its rotation to cause weft thread trapped in one of said devices to extend between two trapping devices, so that the weft can be drawn into a loop to be presented for insertion into the warps.

55 4. Weft measuring apparatus for shuttleless looms, said apparatus comprising means for drawing weft yarn into a loop, a rotatable member, and trapping devices mounted thereon at a distance apart just sufficient for the uninterrupted passage of said drawing means between them, said rotating member being adapted by its rotation to cause weft thread trapped in one of said devices to extend between two trapping devices, so that the weft can be drawn into a loop to be presented for insertion into the warps.

65 5. Weft measuring apparatus for shuttleless looms, said apparatus comprising movable trapping devices adapted successively to take up a position in which weft thread trapped in one of said devices can be drawn into a loop to be presented for insertion into the warps, and means operating to actuate said trapping devices by their movement over said means.

75 6. Weft measuring apparatus for shuttleless looms, said apparatus comprising movable trapping devices adapted successively to take up a position in which weft thread trapped in one of said devices can be drawn into a loop to be pre-

sented for insertion into the warps, and common means operating to actuate each of said trapping devices in turn by the movement of the devices over said means.

7. Weft measuring apparatus for shuttleless looms, said apparatus comprising associated trapping and severing devices adapted successively to move into a position in which weft thread trapped in one of said trapping devices can be drawn into a loop to be presented for insertion into the warps, and means operating to actuate said trapping and severing devices by their movement over said means.

8. Weft measuring apparatus for shuttleless looms, said apparatus comprising means for drawing weft yarn into a loop, a rotatable member, two trapping devices mounted on said member, and cam means adapted to actuate said trapping devices by the rotation of said member relative to said cam means, the trapping devices in turn being adapted to engage a weft thread and to bring it into a position where it can be drawn into a loop for insertion into the warps.

9. Weft measuring apparatus for shuttleless looms, said apparatus comprising means for drawing weft yarn into a loop, a rotatable member, two sets of associated trapping and severing devices mounted on said member, and cam means adapted to actuate said trapping and severing devices by the rotation of said member relative to said cam means, the trapping devices in turn being adapted to engage a weft thread and to bring it into a position where it can be drawn into a loop for insertion into the warps, and the severing devices being adapted to sever said loop from the supply.

10. Weft measuring apparatus for shuttleless looms, said apparatus comprising movable trapping devices, and weft loop forming means adapted to move in a fixed path so as to engage weft thread trapped in one of said devices so as to form a loop of weft and to draw the weft through another of said devices, whose movements in turn carry the weft across the path of said loop forming means in readiness for the drawing of another loop.

11. In apparatus of the character described, a stationary thread holder, cutter and gripper mechanism movable toward and from said thread holder, said mechanism being adapted for engaging a thread held by said holder and moving an end of said thread from said holder, means for drawing into a loop between said mechanism and said holder a thread drawn by said mechanism from said holder, and weft-inserting means for inserting said looped thread.

12. In apparatus of the character described, a thread holder, gripper and cutter mechanism movable relatively toward and from said holder, means for operating said mechanism for gripping and cutting a thread positioned by said holder, said mechanism carrying an end of said thread from said holder, means for drawing into a loop between said mechanism and said holder a thread drawn by said mechanism from said holder, and a weft-inserting device for inserting in a shed the thread forming said loop.

13. A shuttleless loom comprising a thread holder, a movable gripping device adapted to draw thread from said holder, loop-drawing means adapted to engage the thread between the gripping device and the holder and to draw same into a loop sufficient for two picks, means for inserting two picks in turn from said loop into the warps, a further gripping device operable in synchronism

with the first-mentioned gripper and the loop-drawing means and adapted to hold the thread during the insertion of the first leg of the loop, and means for severing the loop from the supply.

5 14. Weft measuring apparatus for shuttleless looms, said apparatus comprising movable trapping devices, means adapted to move the trapping devices successively so as to carry weft thread trapped in one of said devices into position to be
10 drawn into a loop to be presented for insertion into the warps, said weft thread then being engaged by another trapping device, and guide means associated with each movable trapping device to lead the weft thread through the trapping device.
15

15. Weft measuring apparatus according to claim 14, wherein the guide means comprise a hook whose free end is adapted to engage the weft thread and lead it into the bight of the
20 hook.

16. Weft measuring apparatus for shuttleless looms, said apparatus comprising loop drawing means and movable trapping devices adapted successively to move across the path of the loop drawing means so that weft thread trapped in one of
25 said devices can be carried across the said path and drawn by the loop drawing means into a loop to be presented for insertion into the warps.

17. Weft measuring apparatus for shuttleless
30 looms, said apparatus comprising loop drawing means, a plurality of trapping devices adapted to move so that weft trapped in one trapping device can be carried by that trapping device across the path of the loop drawing means so as to be drawn
35 thereby into a loop to be presented for insertion into the warps, while the next trapping device

in turn is carried into engagement with the weft preparatory to the drawing of a succeeding weft loop.

18. Weft measuring apparatus for shuttleless looms, said apparatus comprising loop drawing means and trapping devices adapted to move successively so that each in turn takes up a position previously occupied by another and engages a weft thread and then takes up a position in which the weft thread trapped therein can be engaged by the loop drawing means so as to be
10 drawn thereby into a loop sufficient for two picks to be presented for insertion into the warps.

19. Weft measuring apparatus for shuttleless looms, said apparatus comprising loop drawing means, two movable trapping devices, and means to move said trapping devices simultaneously so that one device carries weft thread trapped therein across the path of the loop drawing means while the other trapping device moves into engagement with the weft preparatory to the drawing of a succeeding weft loop.
15 20

20. Weft measuring apparatus for shuttleless looms, said apparatus comprising loop drawing means, trapping devices movable successively across the path of the loop drawing means so as to position weft thread trapped therein for drawing into a loop to be presented for insertion into the warps, and cutting means into engagement with which the weft is brought at each loop drawing operation by the movement of the trapping devices, said means severing the weft between the supply and the trapping device in which it has been trapped.
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