

**July 12, 1938.**

**W. M. WATTIE**

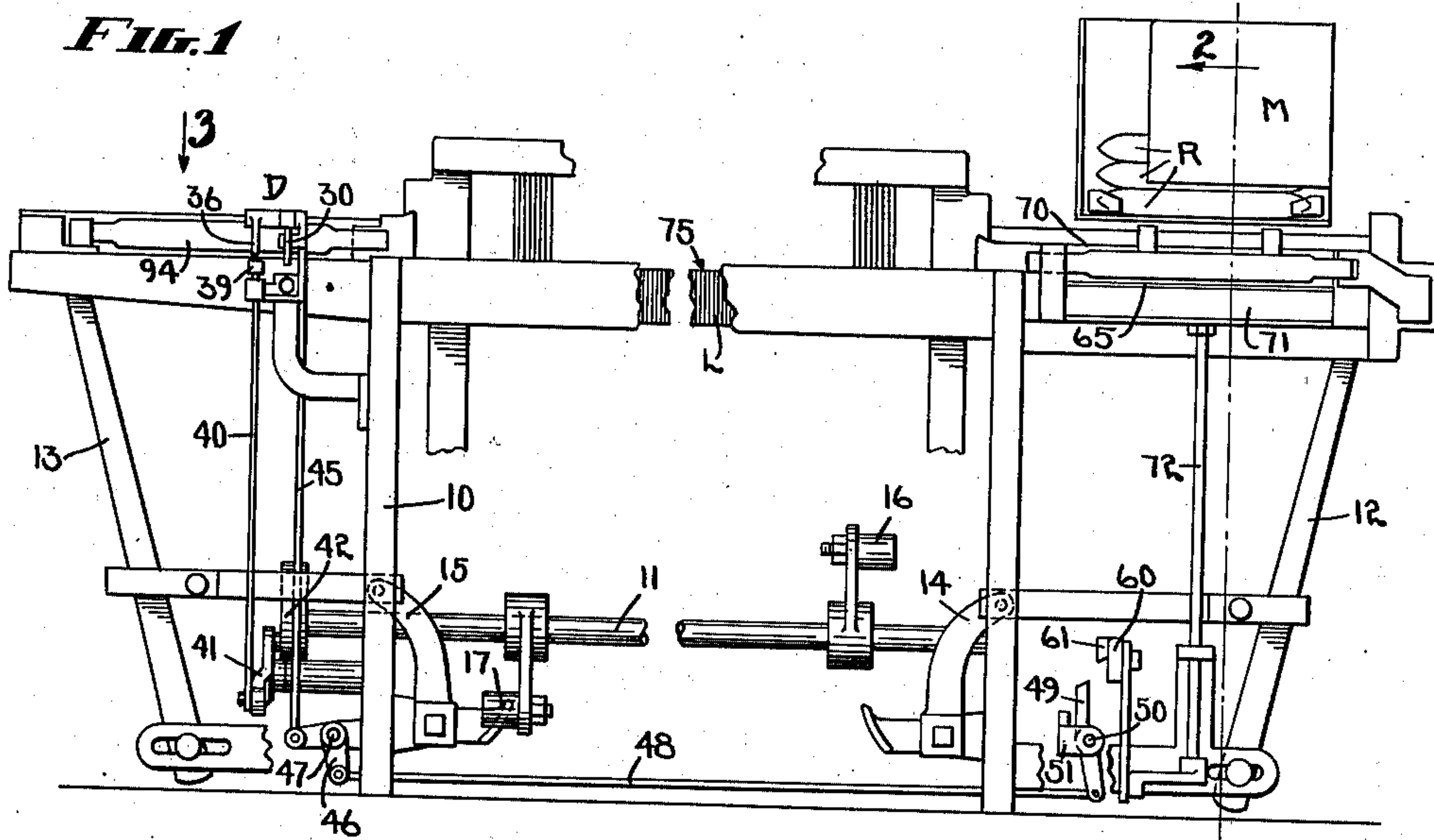
**2,123,266**

# SMASH PREVENTER FOR SHUTTLE CHANGING LOOMS

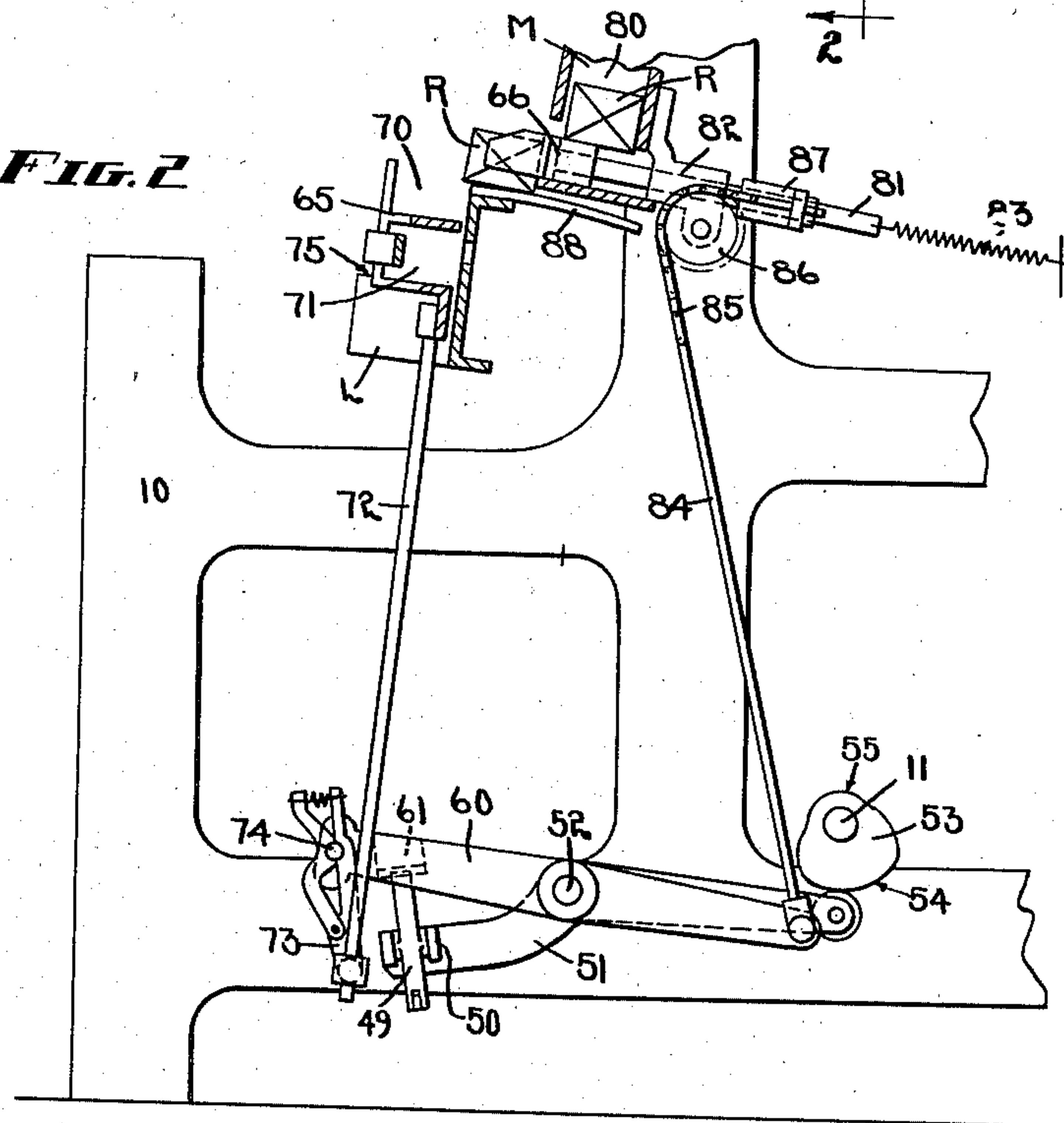
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2 Sheets-Sheet 1

**FIG. 1**



**FIG. 2**



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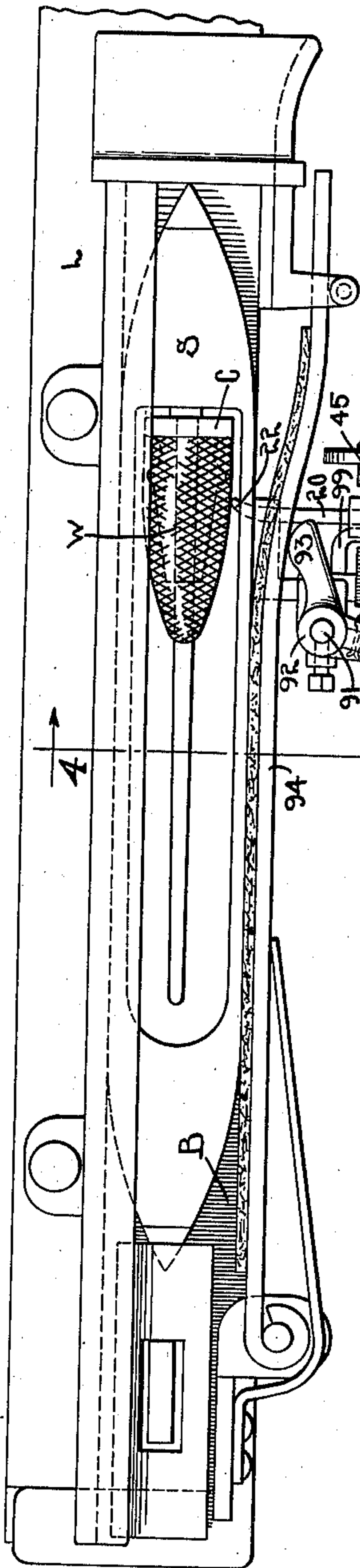


FIG. 3

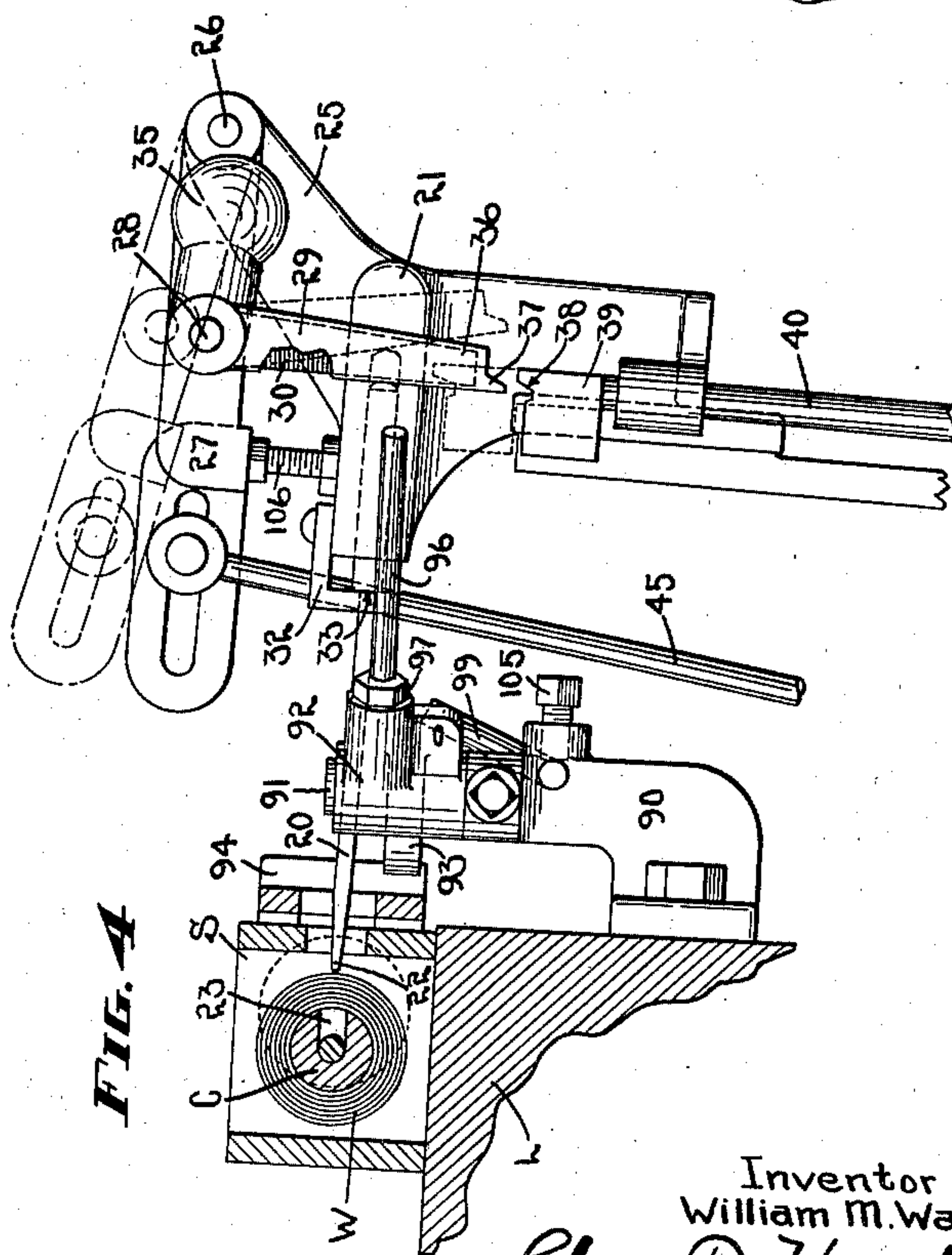


FIG. 4

FIG. 5

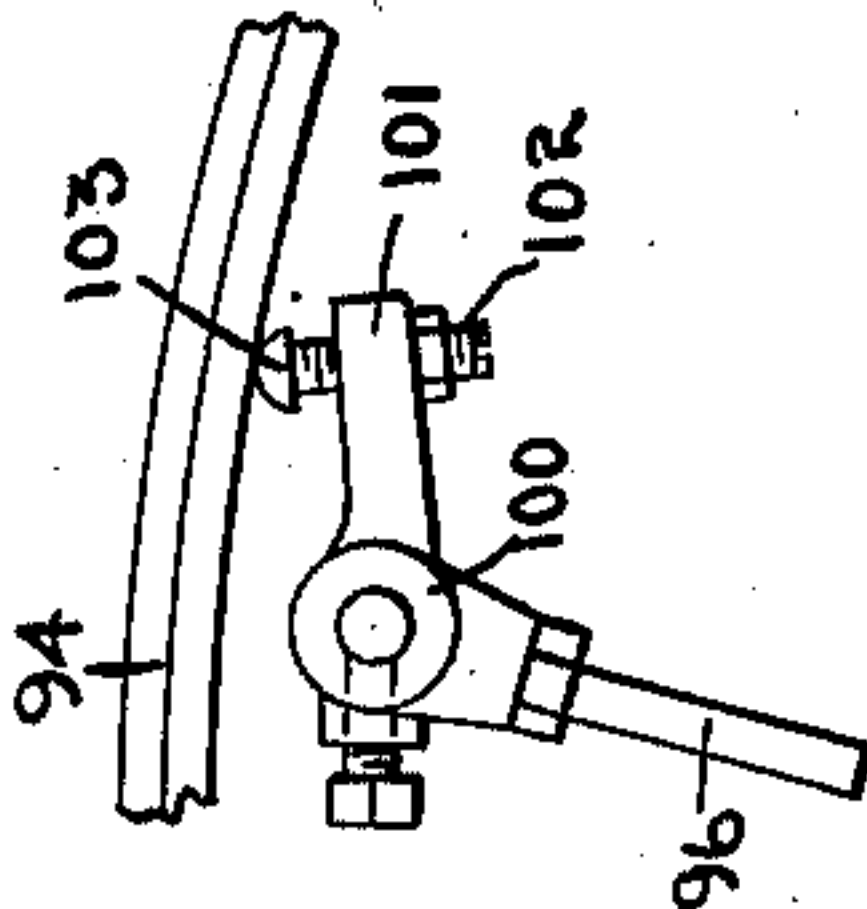
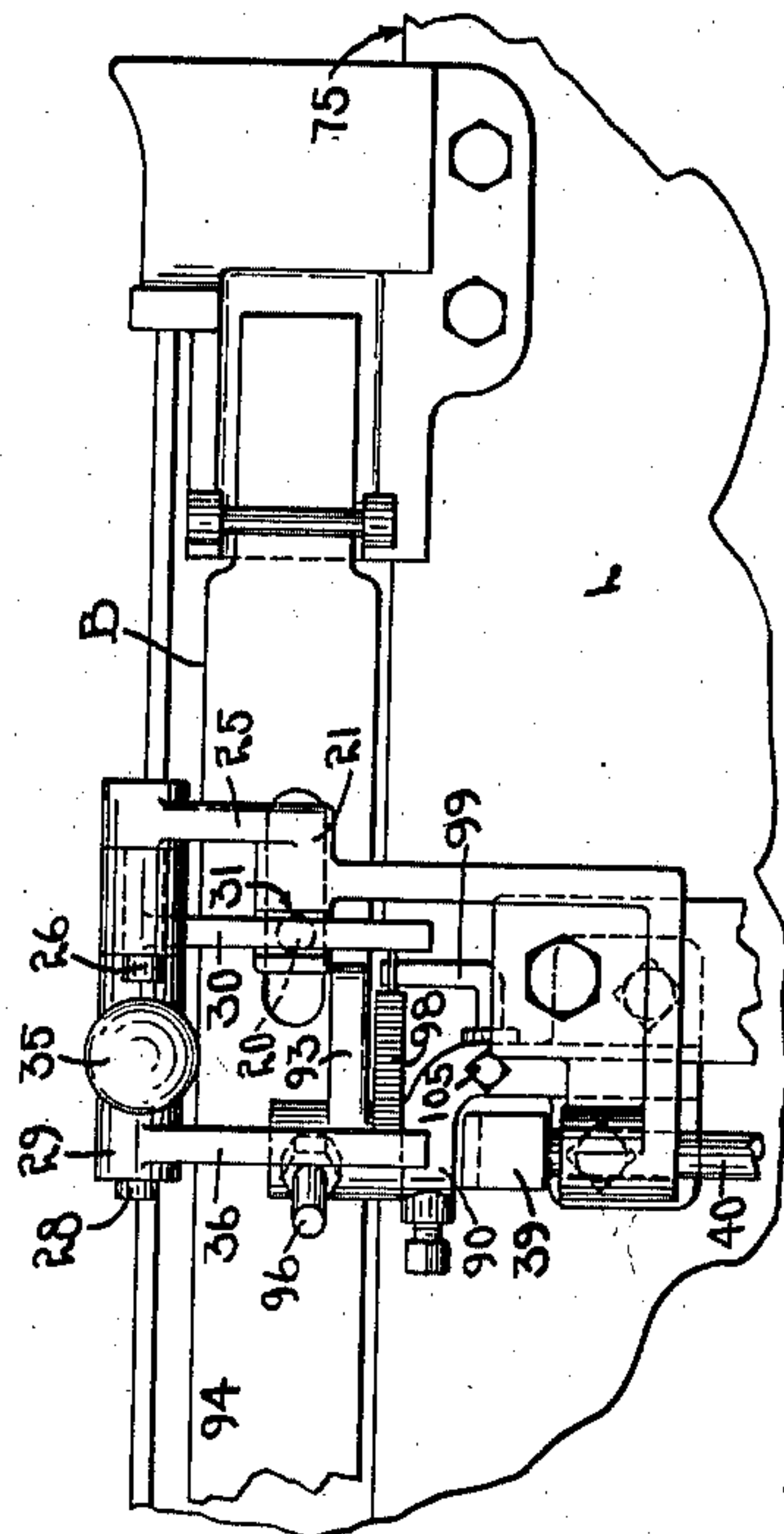


FIG. 6



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## UNITED STATES PATENT OFFICE

2,123,266

## SMASH PREVENTER FOR SHUTTLE CHANGING LOOMS

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Application June 22, 1936, Serial No. 86,513

11 Claims. (Cl. 139—230)

This invention relates to mechanism for preventing a shuttle smash on a shuttle changing loom and it is the general object of the invention to disable the weft detector on detecting beats of the loom if the shuttle is not present at the detector side.

In the type of shuttle changing looms to which my invention more particularly relates, the weft detector cooperates with a pump rod having a working stroke every other beat of the loom when the lay is on front center position. The detector enters the shuttle at this time and if sufficient weft be present for continued weaving the feeler pushes an indicator out of the path of the pump rod. On the other hand, if indication is to be given by the detector, the latter fails to move the indicator out of the path of the pump rod, and as the latter rises the shuttle changing mechanism at the opposite side of the loom is set for a shuttle change by a movement of the indicator. As set forth hereinafter the shuttle changing mechanism operates when the lay is in back position, and there are rising boxes at the magazine end the upper of which receives the reserve shuttle from the magazine and the lower of which receives the oncoming depleted shuttle. For proper operation the top cell of the shuttle box mechanism must be empty.

If the weaver, after correcting a mispick, should inadvertently put the active shuttle into the shuttle box at the magazine end instead of the detector end where it should go, the action of the pump rod will be out of step with the picking of the loom. Since there is no weft in the shuttle box adjacent the detector at this time the latter indicates for a shuttle change and the boxes at the opposite or changer end start immediately to rise. As the shuttle changer acts to advance a reserve shuttle toward the top cell now occupied by a misplaced weaving shuttle, the incoming and active shuttles will collide to cause a smash. It is to be understood that the picking mechanism in such looms is set to operate the picker sticks alternately, and it is for this reason that the shuttle in the top cell of the shuttle changer end will not be picked as the lay moves to top center position on that beat of the loom.

It is an important object of my present invention to correct the previously described defects by causing the detector or the indicator to assume such a position as will prevent setting of the shuttle changer on those picks of the loom when detection would normally take place and the shuttle is absent from the shuttle box adjacent the detector. This result I may accomplish

by a controller operated through the binder of the box at the detector end, said connection being rendered incapable of controlling or disabling the indicator when a shuttle is in the box, thereby permitting the detector to control replenishment. The controller will however be operative to disable the indicator and thus prevent setting of the magazine when the binder is in its in position due to shuttle absence.

With these and other objects in view which will appear as the description proceeds, my invention resides in the combination and arrangement of parts hereinafter described and set forth.

In the accompanying drawings, wherein a convenient embodiment of my invention is set forth,

Fig. 1 is a front elevation of a loom having my invention applied thereto,

Fig. 2 is a vertical section on an enlarged scale on line 2—2 of Fig. 1 looking in the direction of the arrows,

Fig. 3 is an enlarged plan view looking in the direction of arrow 3, Fig. 1,

Fig. 4 is a vertical section on line 4—4, Fig. 3, on an enlarged scale,

Fig. 5 is a front elevation taken in the direction of arrow 5, Fig. 3, and

Fig. 6 is a detailed plan view showing a modification of the disabling finger for the indicating lever.

Referring to the drawings, the loom frame 10, bottom shaft 11, right and left picker sticks 12 and 13, respectively, and right and left picking levers 14 and 15, respectively, may be of usual construction. Right and left picking rolls 16 and 17, respectively, rotate with the bottom shaft and are set 180° apart so that the picking levers are actuated on alternate beats of the loom. As shown in Fig. 1 the picking motion at the left side of the loom is about to be set in motion by the picking roll 17, while the picking roll 16 at the opposite side is away from operating position with respect to the right lever 14. This order of picking is customary and bears a relation to the matter to be described hereinafter.

At the left hand side of the loom there is located a weft detecting mechanism designated generally at D comprising a weft engaging detector finger 20 slidably mounted in a fixed stand 21 and having a rear tip 22 to engage the weft W in the weaving shuttle S located in shuttle box B. A slot 23 may be formed on the bobbin or weft carrier C to receive the feeler tip when the weft is substantially exhausted. The feeler is of the caliper type and is moved forwardly by en-



gagement with the weft on the bobbin. When the weft uncovers the slot 23 the feeler tip enters it and the detector finger 20 remains substantially at rest.

5 The stand 21 has a horn 25 provided with a pivot stud 26 on which turns a transmitting lever 27. A stud 28 on said lever provides pivotal support for an indicating lever 29 having a depending arm 30 located in a slot 31 in the stand 21 and being limited as to rearward motion by the stand. 10 The feeler 20 has the forward end thereof in alignment with the arm 30 and a stop 32 adjustably held on the stand 21 to assume a plurality of positions with respect to the forward position 15 of the lay engages a shoulder 33 on the detector to limited rearward movement thereof. A counter-weighted arm 35 on the indicating lever holds the arm 30 in the normal rearward position suggested in Fig. 4 and preferably against the forward end of the detector. The counter-weight 20 serves to return the detector to the rearward position after a forward detecting motion.

A lifting arm 36 formed integral with the indicating lever has a lug 37 vertically over a notch 25 38 formed in the upper end of an actuator head 39. The latter is secured to the upper end of an actuator rod 40 the lower end of which is pivoted to the forward end of lever 41 actuated by a cam 42 secured to the bottom shaft 11. The cam is 30 set so that the actuator rod 40 is given a working upward stroke on alternate beats of the loom when the shuttle S is on the detector or left side of the loom, as viewed in Fig. 1. When the detector swings the indicating lever to the dotted 35 position indicated in Fig. 4 due to presence of a sufficient supply of weft for continued weaving, the actuator head 37 rises without imparting motion to the arm 36, but when the weft is substantially exhausted the arm 30 remains at rest and 40 the counter-weight maintains the arm 36 in the path of the head 39. As the rod 40 rises under these conditions engagement between the head 39 and the arm 36 will lift the transmitting lever 27 from the full to the dot and dash line positions 45 shown in Fig. 4.

A rod 45 is connected to the transmitting lever by an attachment permitting adjustment relatively to the pivot 26 and is attached at its lower end to a bell crank lever 46 movable about a fixed 50 pivot 47 and attached to a horizontal rod 48 extending across the loom to the shuttle changing side. The right end of the rod 48 as shown in Fig. 1 is attached to the lower end of a lifting dog 49 pivoted as at 50 to a lever 51 movable about a 55 fixed axis 52, see Fig. 2. A cam 53 on the bottom shaft has high and low dwells 54 and 55, respectively, and oscillates the lever 51, giving the latter a motion which will raise the dog when the detector acts to determine the condition of weft in 60 the weaving shuttle.

A box lifter lever 60 also pivoted about the axis 52 carries a lug 61 to be engaged by the upper end of the dog to effect rocking of the lifter lever whenever the detector indicates exhaustion 65 of weft. The timing of the parts is such that lever 60 will start to oscillate either when the loom is approximately in its foremost position, or immediately after the lay has started its rearward movement from detecting position. The 70 rocking of lever 60 accomplishes two results, namely, the raising of the shuttle box structure 65 preparatory to a shuttle change, and the actuation of a shuttle advancer designated generally at 66 to move a reserve shuttle from the magazine M toward the rising box. 75

The box structure comprises upper and lower cells 70 and 71, respectively, mounted on a box lifter rod 72 connected to the bottom of a yielding link 73. The latter is attached by means of a pin 74 to the forward end of lever 60 and as the 5 left end of said lever rises, as viewed in Fig. 2, the cell 70, which is normally down and in picking position, will move above picking position preparatory to receiving a reserve shuttle R. At the same time the lower cell 71 will move into alignment 10 with the shuttle race 75 to receive the oncoming depleted shuttle which is travelling from the detector end of the loom.

The magazine comprises a guideway 80 in which are stored reserve shuttles R and the advancer head 66 is secured to the forward end of a sliding rod 81 mounted in a guide bearing 82 rigid with the magazine and held yielding rearwardly by a spring 83. A rod 84 is attached to the rear end of lever 60 and has the upper end 20 thereof connected to a chain 85 trained around a sheave 86 and then attached to a block 87 secured to the rod 81. When the lever 60 rocks in a right hand direction at the time of a shuttle changing operation, referring to Fig. 2, rod 84 will 25 be depressed and the advancer will consequently be moved forwardly to push the bottom reserve shuttle R onto fingers 88 secured to and extending rearwardly from the lay. This motion of the advancer head 66 moves a reserve shuttle from 30 the magazine toward cell 70 as the latter rises and when the lay reaches back center the incoming shuttle will be in position to fall into the cell 70. If at this time box 70 is occupied a smash will result. 35

The drawings indicate only those parts of the magazine which are necessary for an understanding of the present invention and it is deemed sufficient to state that during a shuttle changing operation the boxes will rise as the reserve 40 shuttle moves forwardly, the operation being completed by the time the lay reaches its rear-most position approximately one-half a pick or beat of the loom after the detector has indicated exhaustion of weft. 45

The matter thus far described of itself forms no part of my present invention and for a further understanding of the detector and shuttle changing mechanism reference may be had to prior Patents Nos. 1,528,852 to Ryon, 1,749,934 to 50 Chevette and to Patents Nos. 2,054,172 and 2,054,179, issued to Turner.

By reference to Fig. 2 it will be understood that should a shuttle be present in cell 70 when the latter starts to rise it will move into interfering 55 position with respect to the incoming reserve shuttle being advanced by the plunger head 66 and my present invention relates to means for preventing such an interference. As already stated, the weaver may have incorrectly placed the shuttle 60 in cell 70 which is normally down at a time when the next pick of the loom is to take place from the opposite or detector end. Under these conditions the lay will move rearwardly through the top center picking position without ejecting the 65 wrongly placed shuttle from cell 70 and the weaving shuttle, not being picked, will move rearwardly as the cell 70 rises preparatory to the shuttle changing operation of the loom.

In carrying my present invention into effect I 70 secure to the forward part of the lay L a small stand 90 provided with a vertical stud 91 on which is pivotally mounted a controller lever 92. The latter has a finger 93, which as shown in the preferred form and illustrated in Fig. 3, has a rounded 75



rear surface to engage the binder 94 of the shuttle box B located at the left or detector end of the loom. An indicator lever controlling pin 96 is adjustably held to the lever 92 by a nut 97, while a spring 98 connected to the lever 92 at one end and to an adjustable wire 99 at the other end tends normally to turn the lever 92 in a left hand direction as viewed in Fig. 3, acting normally to move the pin 96 into alignment with the lifter arm 36. The tension of the spring 98 may be varied by changing the longitudinal position of the wire 99 through adjustments afforded by the holding screw 105.

As shown in Fig. 6, a modified controller lever 100 has a finger 101 in which is adjustably mounted a screw 102 the head 103 of which is positioned for engagement with the binder 94. In other respects the lever illustrated in Fig. 6 is similar to that shown in Fig. 3.

Under normal conditions when the loom is picking properly and there is sufficient weft for continued weaving in the shuttle S the lever 36 will be moved out of vertical alignment with the plunger head as already described, and the rod 45 will therefore remain at rest, its position being determined by a stop screw 106 carried by the stand 21 and engaging a portion of the transmitting lever 27 as shown in Fig. 4. The advancing lay causes the pin 96 to approach the arm 36, but as the weaving shuttle enters the box it swings the binder outwardly and the finger 93 of the control lever is therefore caused to move forwardly relatively to the lay and move the pin 96 to the left, or to the position shown in Fig. 3, where it will traverse a path to one side of arm 36. It will be seen by this relation that presence of a shuttle in the shuttle box B at the detector end of the loom rocks the control lever to a position where it cannot disable the indicating lever. If the shuttle fails to reach box B on a detecting beat of the loom, the controller lever will not be rocked due to the fact that the binder is in rearward position. The rod 96 will thereupon engage the arm 36 and rock the same forwardly to the dotted line position of Fig. 4, thereby preventing the detector from giving a false indication of weft exhaustion.

From this description it will be seen that the controller lever does not interfere in any way with the proper operation of the detector when the weaving shuttle is in box B on a detecting beat of the loom, but said lever does act to prevent the detector from giving a false indication when the shuttle is absent on a detecting beat. This relation is particularly advantageous when the loom is equipped with the caliper type of feeler which would normally act to give an indication of weft exhaustion whenever weft is absent due either to exhaustion of weft or non-arrival of the weaving shuttle in the box B.

Whenever the pin 96 rocks the indicating lever the dog 49 will be prevented from engaging the lug 61 and the shuttle changing mechanism at the right hand side of the loom will therefore remain at rest and the presence of the weaving shuttle at the magazine end of the loom will not cause breakage.

From the foregoing it will be seen that I have provided simple means for preventing the weft detector from initiating a shuttle changing operation of the loom when the weaving shuttle is absent from the detector side of the loom on detecting beats. It will further be seen that I have provided a small lever on the lay to be rocked by the binder when the weaving shuttle arrives at the detector side of the loom, the lever normally

tending to disable the indicating lever but being prevented from doing so by the binder when the shuttle arrives.

Having thus described my invention it will be seen that changes and modifications may be made therein by those skilled in the art without departing from the spirit and scope of the invention and I do not wish to be limited to the details herein disclosed, but what I claim is:

1. In a shuttle changing loom having a lay and operating with a weaving shuttle, means to pick the shuttle from alternate ends of the lay on successive beats of the loom, a shuttle changing mechanism located behind the lay and effective to advance a reserve shuttle forwardly as the lay moves rearwardly, a weft detector at the opposite end of the loom to indicate exhaustion of weft, setting mechanism for the shuttle changing mechanism controlled by the detector and effective when the latter indicates weft exhaustion to cause the shuttle changing mechanism to advance a reserve shuttle, controller means on the detector end of the loom normally positioned on detecting beats of the loom to move the setting mechanism out of control of the detector, and means moved by the shuttle when arriving at the detector end of the loom to move the controller means out of normal position to a position where said controller means is incapable of moving the setting mechanism.

2. In a shuttle changing loom having a lay and operating with a weaving shuttle, means to pick the weaving shuttle from alternate ends of the lay on successive backward beats thereof, a shuttle changing mechanism located behind one end of the lay and effective to advance a reserve shuttle toward the lay as the latter moves rearwardly, a weft detector at the other end of the lay operative when weft is absent on a detecting beat of the lay to indicate weft exhaustion, setting mechanism for the shuttle changing mechanism controlled by the detector and effective when the latter indicates weft exhaustion to set the shuttle changing mechanism for advancing a reserve shuttle, a shuttle binder on the lay at the detector end thereof, and means positioned by the binder when the latter is in a position corresponding to absence of the weaving shuttle from the detector end of the loom on a detecting beat to move the setting mechanism to a position out of control of the detector to prevent the latter from causing the shuttle changing mechanism to advance a reserve shuttle.

3. In a shuttle changing loom having a lay and operating with a weaving shuttle, means to pick the weaving shuttle on alternate ends of the lay on successive backward beats thereof, a shuttle changing mechanism located behind one end of the lay and effective to advance a reserve shuttle toward the lay as the latter moves rearwardly, a weft detector at the other end of the loom operative when weft is absent on a detecting beat to indicate weft exhaustion, setting mechanism for the shuttle changing mechanism controlled by the detector and effective when the latter indicates weft exhaustion to set the shuttle changing mechanism for advancing a reserve shuttle, a binder on the lay at the detector end thereof, and a controller for the setting mechanism movably mounted on the lay and positioned by the binder and effective on detecting beats of the loom when the shuttle is absent from the detector end of the loom to move the setting mechanism to a position out of control of the detector to prevent the latter from causing the setting mechanism



to set the shuttle changing mechanism for advancing a reserve shuttle.

4. In a shuttle changing loom having a lay and operating with a weaving shuttle, means to pick the shuttle from alternate ends of the lay on successive backward beats thereof, a shuttle changing mechanism located behind one end of the lay and effective to advance a reserve shuttle toward the lay as the latter moves rearwardly, a weft detector adjacent the other end of the lay operative when weft is absent on detecting beats of the loom to indicate weft exhaustion, a pump rod having a working stroke on detecting beats of the loom, an indicator normally positioned in the path of said pump rod to be moved by the latter and movable out of said path by the detector when sufficient weft for continued weaving is present at the detector end of the lay, said indicator remaining in the path of the pump rod when the detector indicates weft exhaustion, connections between the indicator and shuttle changing mechanism to cause the latter to advance a reserve shuttle toward the lay when said indicator is moved by the pump rod, a controller for the indicator normally positioned on detecting beats of the loom to move the indicator out of the path of the pump rod, and means operated by the shuttle when arriving at the detector end of the loom to move the controller out of normal position to a position where said controller is incapable of moving the indicator.

5. In a shuttle changing loom having a lay and operating with a weaving shuttle, means to pick the shuttle from alternate ends of the lay on successive backward beats thereof, a shuttle changing mechanism located behind one end of the lay and effective to advance a reserve shuttle toward the lay as the latter moves rearwardly, a weft detector adjacent the other end of the lay operative when weft is absent on a detecting beat to indicate weft exhaustion, a pump rod at the detector end of the loom having a working stroke on detecting beats, a lever pivoted to the lay at the detector end of the loom, a shuttle binder on the lay to move the lever to normal position when a weaving shuttle is in engagement with said binder, means to move the lever to abnormal position when the weaving shuttle is absent, an indicator normally in the path of the pump rod to be moved out of said path by the detector when weft is present at the detector end of the loom, said indicator remaining in said path when the detector indicates absence of weft, connections between the indicator and shuttle changing mechanism to cause the latter to advance a reserve shuttle toward the lay when said indicator is moved by the pump rod, and means carried by the lever and effective when the latter is in abnormal position on a detecting beat of the loom to move the indicator out of the path of the pump rod.

6. In a shuttle changing loom having a lay and operating with a weaving shuttle, a pair of shifting shuttle boxes normally down at one end of the lay, a shuttle changing mechanism at said end of the lay effective to move a reserve shuttle toward the shuttle boxes as the latter approach the shuttle changing mechanism, lifting means to raise the shuttle boxes at the beginning of a shuttle changing operation of the loom to receive a reserve shuttle delivered by the shuttle changing mechanism, a weft detector at the opposite end of the loom capable of indicating weft exhaustion on alternate and detecting beats of the lay if weft is absent on a detecting beat, control

mechanism for the lifting means controlled by the detector and effective when the latter indicates weft exhaustion to cause the lifting means to initiate rising of the shuttle boxes, a placer for the control mechanism normally positioned to move the control mechanism out of control of the detector on detecting beats of the loom, and means operated by the shuttle when arriving at the detector end of the loom to move the placer out of normal position to a position where said placer is incapable of moving the control mechanism.

7. In a shuttle changing loom having a lay and operating with a weaving shuttle, a pair of shifting shuttle boxes normally in down position at one end of the lay, a reserve shuttle magazine at said end of the lay effective during a shuttle changing operation of the loom to move a reserve shuttle toward the shuttle boxes as the lay approaches the magazine, lifting means to raise the shuttle boxes at the beginning of the shuttle changing operation of the loom to receive the reserve shuttle from the shuttle changing mechanism, a weft detector at the opposite end of the loom effective on alternate and detecting beats of the lay when weft is absent to indicate weft exhaustion, setting mechanism controlled by the detector and effective when the latter indicates weft exhaustion to set the lifting means for raising the boxes, a controller for the setting mechanism normally positioned on a detecting beat of the loom to prevent the setting mechanism from being controlled by the detector, and means operated by the shuttle when arriving at the detector end of the loom to move the controller to a position where said controller is incapable of affecting the control which the detector has over said setting mechanism.

8. In a shuttle changing loom having a lay and operating with a weaving shuttle, shuttle changing mechanism adjacent one end of the lay, means forming part of said mechanism to advance a reserve shuttle toward the lay, shiftable shuttle boxes normally down to be raised to receive a reserve shuttle, a weft detector at the opposite end of the loom capable on alternate beats of the latter when weft is absent of indicating weft exhaustion, lifting means for the shuttle boxes, setting mechanism for the lifting means controlled by the detector and effective when the latter indicates weft exhaustion to set the lifting means to raise the shuttle boxes, controller means on the detector end of the loom normally positioned on detecting beats of the loom to move the setting mechanism out of control of the detector, and means moved by the shuttle when arriving at the detector end of the loom to move the controller means out of normal position to a position where said controller means is incapable of moving the setting mechanism.

9. In a shuttle changing loom having a lay and operating with a weaving shuttle, shuttle changing mechanism at one end of the lay effective to advance a reserve shuttle toward the lay, a weft detector adjacent the opposite end of the lay effective when weft is absent from said opposite end of the lay on alternate beats of the loom to indicate weft exhaustion, setting mechanism controlled by the detector and effective when the latter indicates weft exhaustion to set the shuttle changing mechanism for advancing a reserve shuttle, controller means on the detector end of the loom normally positioned on detecting beats of the loom to move the setting mechanism out of control of the detector, and means moved by the



shuttle when arriving at the detector end of the loom to move the controller means out of normal position to a position where said controller means is incapable of moving the setting mechanism.

- 5 10. In a shuttle changing loom having a lay and operating with a weaving shuttle, means to pick the shuttle from opposite ends of the lay on successive beats thereof, a shuttle changing mechanism adjacent one end of the lay to advance a reserve shuttle toward the latter for a shuttle changing operation, a weft detector at the opposite end of the loom operative on those beats of the loom when the latter is to pick the weaving shuttle from the detector end of the loom to indicate weft exhaustion when weft is absent at the detector end of the lay, setting mechanism controlled by the detector and effective when the latter indicates weft exhaustion to set the shuttle changing mechanism for advancing a reserve shuttle, controller means on the detector end of the loom normally positioned on detecting beats of the loom to move the setting mechanism out of control of the detector, and means moved by the shuttle when arriving at the detector end of the loom to move the controller means out of normal

position to a position where said controller means is incapable of moving the setting mechanism.

11. In a shuttle changing loom, a lay, means to pick a weaving shuttle from alternate ends of the lay on successive beats of the loom, a weft detector mechanism at one end of the loom operative on those beats of the loom when the weaving shuttle is to be picked from the detector end of the loom to indicate weft exhaustion, shuttle changing mechanism at the opposite end of the loom to advance a shuttle toward the lay, setting mechanism controlled by the detector and effective when the latter indicates weft exhaustion to set the shuttle changing mechanism for advancing a reserve shuttle, controller means on the detector end of the loom normally positioned on detecting beats of the loom to move the setting mechanism out of control of the detector, and means moved by the shuttle when arriving at the detector end of the loom to move the controller means out of normal position to a position where said controller means is incapable of moving the setting mechanism.

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