

Dec. 10, 1940.

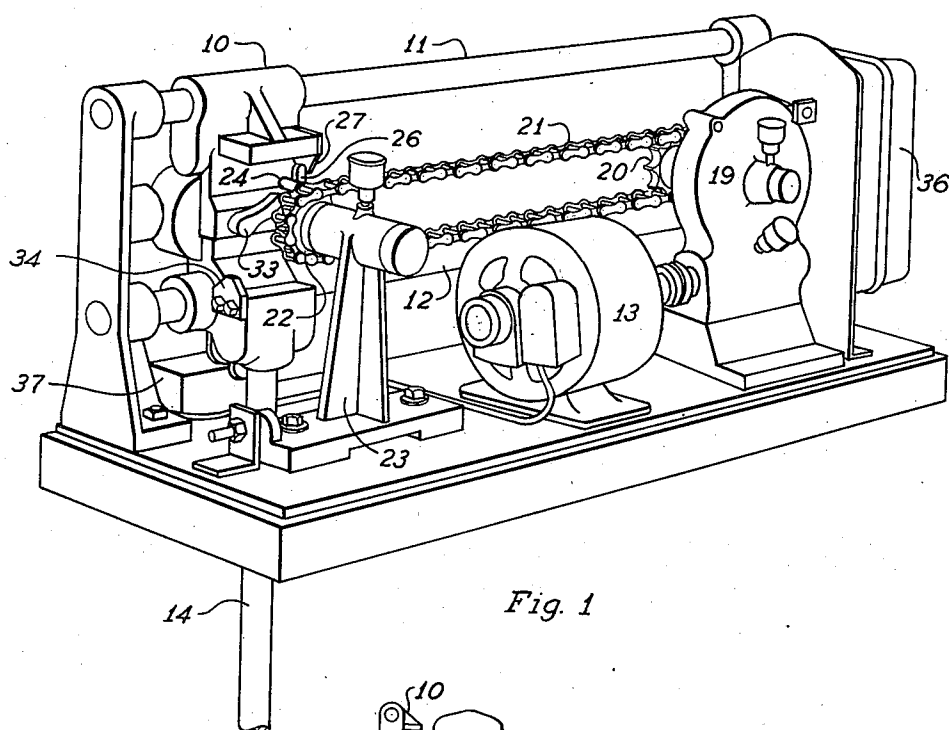
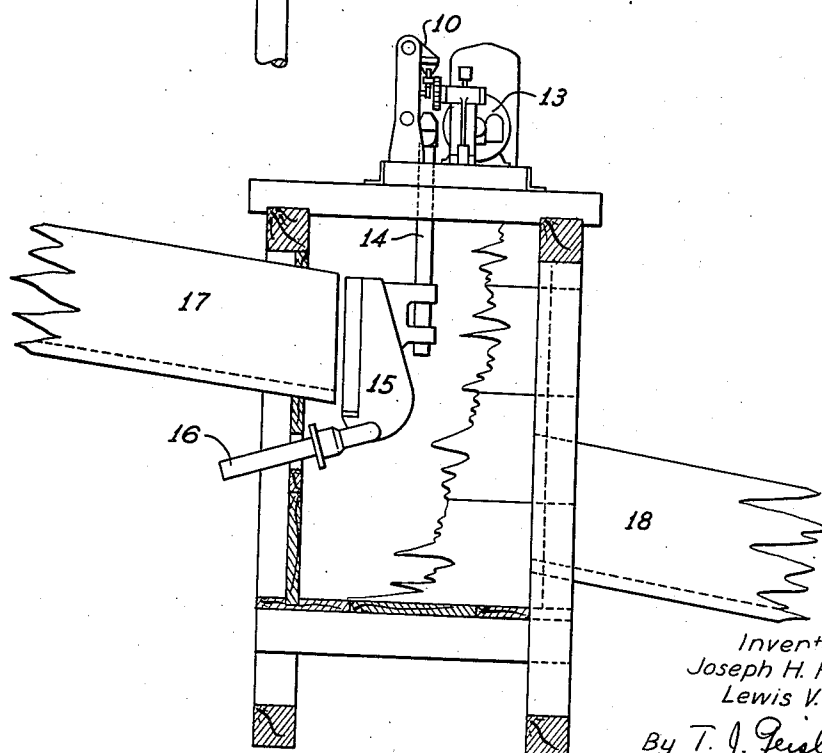
J. H. HEGINBOTHAM ET AL

2,224,431

RECIPROCATING CARRIAGE FOR SAMPLING APPARATUS AND THE LIKE

Filed July 17, 1939

3 Sheets-Sheet 1



Inventors
Joseph H. Heginbotham
Lewis V. Stanley

By T. J. Feisler and
H. Feisler
Attorneys

Dec. 10, 1940.

J. H. HEGINBOTHAM ET AL

2,224,431

RECIPROCATING CARRIAGE FOR SAMPLING APPARATUS AND THE LIKE

Filed July 17, 1939

3 Sheets-Sheet 2

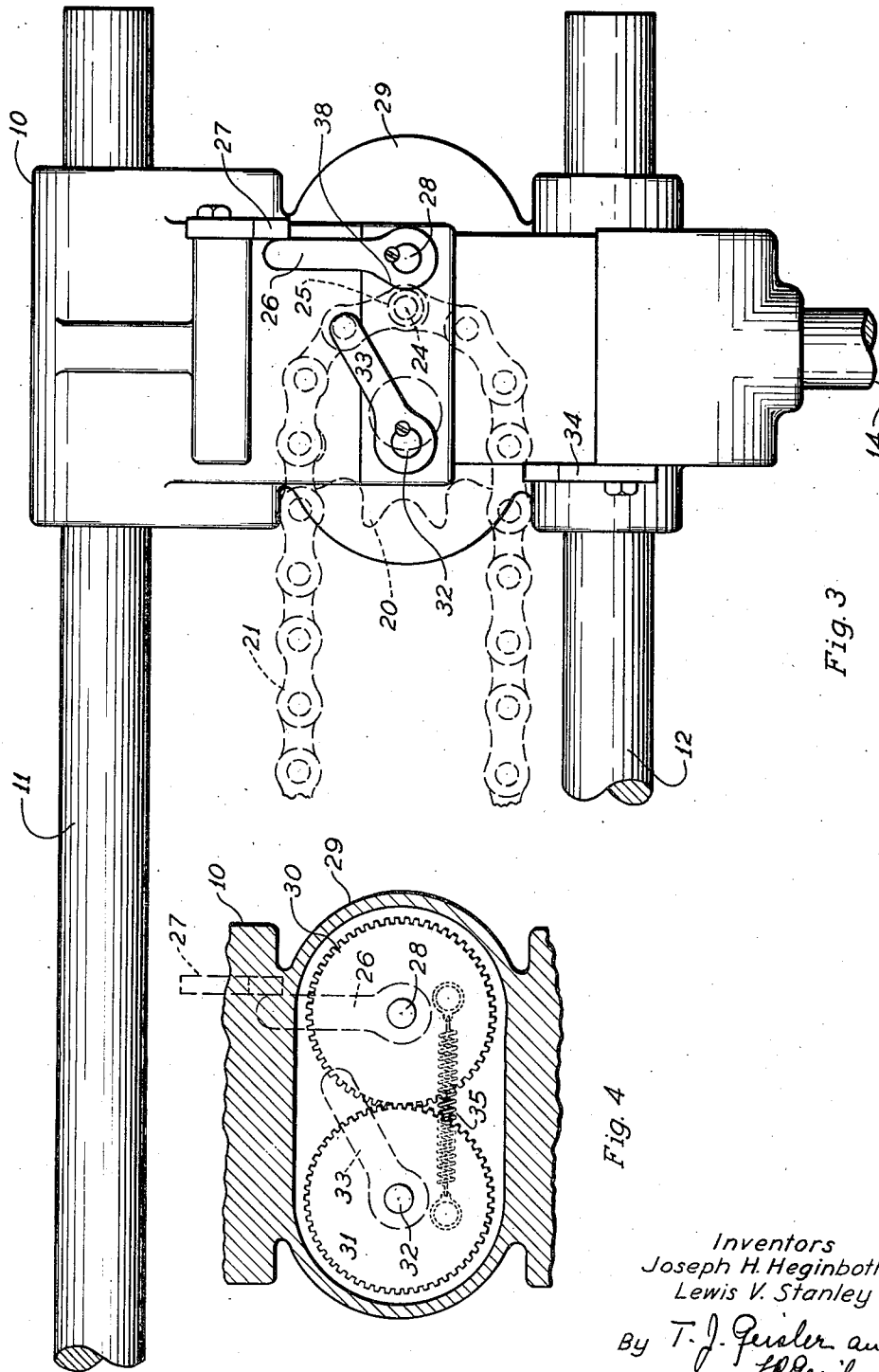


Fig. 4

Fig. 3

Inventors
Joseph H. Heginbotham
Lewis V. Stanley
By T. J. Geisler and
T. P. Geisler
Attorneys

Dec. 10, 1940.

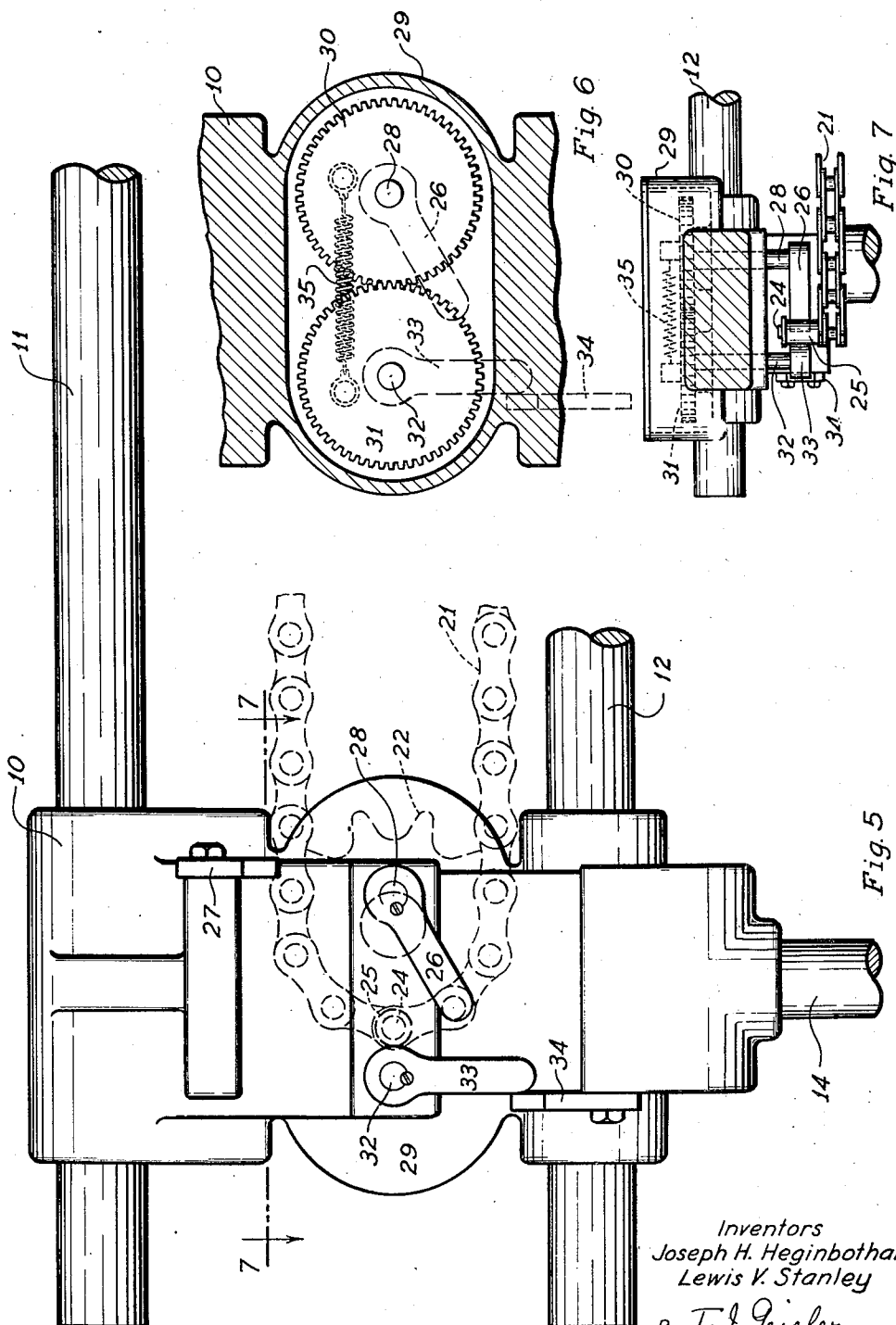
J. H. HEGINBOTHAM ET AL

2,224,431

RECIPROCATING CARRIAGE FOR SAMPLING APPARATUS AND THE LIKE

Filed July 17, 1939

3 Sheets-Sheet 3



Inventors
Joseph H. Heginbotham
Lewis V. Stanley

By T. J. Geisler
and F. Geisler
Attorneys

UNITED STATES PATENT OFFICE

2,224,431

RECIPROCATING CARRIAGE FOR SAMPLING
APPARATUS AND THE LIKE

Joseph H. Heginbotham and Lewis V. Stanley,
Salt Lake City, Utah, assignors to The General
Engineering Company, Salt Lake City, Utah, a
corporation of Utah

Application July 17, 1933, Serial No. 235,022

7 Claims. (Cl. 74—37)

This invention relates to a mechanism in which a carriage reciprocates on suitable guideways, and, relates particularly to a reciprocating carriage used in sampling machines in which the "cutter" element of the sampler, which passes across a stream of material at regular intervals, is supported on a reciprocating carriage.

It is desirable, in sampling machines of the type indicated, that the cutter should pass across the stream not only at regular predetermined intervals, but also with uniform speed, in order that a correct sample of the entire stream may be secured at that particular interval. An object of this invention is to provide a reciprocating carriage, suitable for supporting a "cutter" in a sampling machine, which will provide uniform speed of the "cutter" across the stream of material from which the samples are taken.

Another object of this invention is to provide a mechanism, associated with a horizontally movable carriage, which will cause the carriage to be moved from one extremity of its path to the other at regular predetermined periods.

A further object of this invention is to provide a reciprocating mechanism which will be simple and sturdy of construction and dependable in operation.

These and incidental objects we attain by providing the carriage in our device with a pair of connected arms, by having a constantly moving, endless sprocket chain carry an element arranged to engage the connected arms alternately, and by otherwise constructing the reciprocating mechanism and associated parts in the manner hereinafter described with reference to the accompanying drawings.

In the drawings:

Fig. 1 is a perspective view of the operating mechanism of a sampling machine showing an embodiment of our invention;

Fig. 2 is an end elevation of the entire sampling apparatus;

Fig. 3 is an enlarged front elevation of the reciprocable carriage with the position of certain parts of the reciprocating means indicated by broken lines, the carriage in this figure being shown as located at the right hand limit of its stroke;

Fig. 4 is a sectional elevation showing the mechanism contained within the central portion of the carriage, certain other parts of the travel reversing means being superimposed in broken line for explanatory purposes;

Figs. 5 and 6 are views similar to Figs. 3 and 4, respectively, but illustrate the positions of parts

when the carriage reaches the left hand limit of its stroke; and

Fig. 7 is a sectional plan taken on the line 7—7 of Fig. 5 but drawn on a slightly reduced scale.

Referring first to Figs. 1 and 2, the carriage 10 is slidably mounted on supporting horizontal guide rods 11 and 12 and is intermittently reciprocated along these guide rods by an electric motor 13 and certain mechanism hereinafter described. A vertical bar 14 is rigidly secured to the bottom of the carriage 10 and supports, on its depending shank, the sample "cutter." This "cutter" comprises a vertically apertured receiving box 15 and an attached discharge pipe 16, which pipe leads to a suitable sample container (not shown). The reciprocable movement of the carriage 10 causes the sample "cutter" to pass in a straight line across the stream of material as the material flows from one trough or launder 17 (Fig. 2) to another trough or launder 18 located at a lower level, the apparatus being so arranged that the travel of the "cutter" will be at right angles to the flow of the stream of material.

The electric motor 13, through the medium of a speed reducing unit 19 (Fig. 1), drives a sprocket wheel 20. An endless chain 21 passes around this driven sprocket wheel 20 and also around an idling sprocket 22. The idling sprocket 22 is carried on an adjustable bracket 23. The endless chain 21 carries an extending pin 24 on the outside, which pin is fitted with a roller 25, this pin and roller being shown more clearly in Fig. 7.

Referring now to Figs. 3, 4, 5 and 6, the carriage 10 is formed with an oval shaped hollow central portion 29 in which a pair of meshing spur gears 30 and 31 are mounted for rotation. Spur gear 30 is secured to the end of a horizontal shaft 32 journaled in one wall of this portion 29, and an arm 26 (Fig. 3) is keyed to the opposite extending end of shaft 32. Similarly, spur gear 31 is secured to the end of shaft 32, and an arm 33, identical in shape and size to the arm 26, is keyed to the opposite extending end of shaft 32. Thus it will be apparent from Figs. 3 and 4 that there cannot be movement of one of these arms 26 or 33 without corresponding in equal movement in the opposite direction of the other arm. These arms are adapted to be engaged alternately by the roller 25 on the extending pin 24 of sprocket chain 21 in a manner to be explained later.

Upper and lower stop plates 27 and 34 are secured to the carriage 10 at the locations shown

in Figs. 3 and 5. These stop plates limit the movements of the arms 26 and 33. Thus when the arms are in the position shown in Fig. 3, the upper stop plate 27 prevents further movement of arm 26 in a clockwise direction, and, since arm 33 cannot move without corresponding opposite movement of arm 26, movement of arm 33 in a counter-clockwise direction is now prevented. However, movement of arm 33 in a clockwise direction is possible until arm 33 in turn engages the lower stop plate 34, as shown in Fig. 5. In this way the stop plates 27 and 34 establish the limitation of arcuate movement of both arms.

An extension spring 35, eccentrically attached to the spur gears 30 and 31, substantially as shown in Figs. 4, 6 and 7, exerts a constant inward pull on the gears in such manner that when the spring is below the horizontal center line of the gears, as shown in Fig. 4, the arm 26 will be held against the upper stop 27 by the tendency of the spring to move the gear 30 and arm 26 clockwise, and, similarly, when the gears have been turned until the spring 35 lies above the center line, as illustrated in Fig. 6, the arm 33 will be held against the lower stop 34 by the action of the spring.

When the upper stretch of chain 21 is traveling to the right, and the carriage is at the left as shown in Fig. 1, the roller 25 on the extending pin 24 of the chain 21 bears against the arm 26, and the arm 26 in turn bears against the upper stop plate 27. Movement of the pin and roller to the right under these conditions moves the carriage to the right.

When the carriage has moved sufficiently far to the right, the roller 25, traveling around the driving sprocket 20 with the chain 21, will move downwardly along the left hand edge of arm 26 and beyond arm 33. As the downwardly moving roller reaches the horizontal center line, between the shafts 28 and 32, the carriage 10 will be moved a slight distance further to the right due to the enlarged curved portion 38 (Fig. 3) at the base of the arm 26. The carriage is now in its extreme right hand position, which is the position shown in Fig. 3. Movement of the carriage now temporarily ceases. When the carriage reaches this extreme position, the power to the motor 13 is shut off by any suitable time switch (not shown) which may, for example, be operated by a projecting lug (not shown) attached to the bottom of the carriage. Any "coasting" of the motor subsequent to the shutting off of the power will not produce any further movement of the carriage 10, since the roller 25 now passes below the horizontal center line, moves away from arm 26 and begins its return travel to the left. Arm 26 is, however, temporarily retained in its raised position against the stop plate 27 by the spring 35.

After a predetermined interval of time, a conventional electric time switch, indicated generally by 36 in Fig. 1, closes the circuit to the motor 13. This results in the chain 21 and roller 25 again being set in motion. Since, as will be apparent from Fig. 3, the roller 25 temporarily will not contact either of the arms 26 or 33, the roller travels freely to the left while the carriage remains in its extreme right position. The roller 25 travels with the chain to the left, passes around the idling sprocket 22, and then travels back to the right. During this time, while the roller is traveling freely, the motor is allowed to attain its normal running speed before the load on the motor, representing the force required to move the carriage

10 back along the guide rods 11 and 12, is again imposed on the motor.

When the roller 25 has returned to the driving sprocket 20 and begins to move downwardly around the sprocket, it now contacts the obliquely positioned arm 33 (see Fig. 3) and moves this arm in a downwardly clockwise direction. Such partial rotation of the arm 33 causes equal rotation of the arm 26 in a counter-clockwise direction. The corresponding rotation of the spur gears 30 and 31 at first occurs against the counteracting force of the spring 35, this spring at first being below the horizontal center line as indicated in Fig. 4. But as soon as the spring has been carried above the center line, it acts to swing the arm 33 against the bottom stop plate 34, holding the arm 33 against the stop 34. The arms will now be in the position shown in Fig. 6.

As the roller 25 is now brought to bear against the arm 33, the carriage will be moved to the left. The travel of the carriage to the left will be at uniform speed, since the motor has been given ample opportunity to attain its full speed. When the carriage has moved sufficiently far to the left, the roller 25 moves upward along the right edge of the arm 33 (see Fig. 5) and the carriage remains in its extreme left position. A switch (not shown) is operated by the carriage to shut off the power to the motor at this point. The operation is similar to that which occurred when the carriage was in the extreme right position previously described. The power to the motor remains shut off for an interval of time determined by the conventional time switch 36 (Fig. 1). When this time switch again closes the circuit to the motor and the chain 21 and roller 25 resume their travel, the roller 25 is once more free to make almost a complete cycle before contacting the arm 26 which has meanwhile remained in the position shown in Fig. 5. When the roller 25 contacts arm 26, the arms 26 and 33 are returned to the position shown in Fig. 4 and now the carriage is caused to move with uniform speed back to the right.

Our device, in this way, provides a simple yet positive means for reversing the direction of a periodically reciprocating carriage, driven by an electric motor rotating always in the same direction. Furthermore, in our device, special provision is made whereby the load on the motor is relieved whenever the motor is started, and the motor is given opportunity to attain its full normal running speed before the carriage load is imposed. This results in a constant rate of travel of the carriage and insures the desired uniform rate of speed of the sample "cutter" when passing through the stream of material from which the periodic samples are taken. This is a very important feature of our invention. Another important feature is the fact that the motor driving the mechanism is required to rotate only in one direction, whereas other devices used for a similar purpose necessitate a reversible motor with reversing switches and more expensive wiring.

While we have described our invention as employed in a sampling apparatus, it is not our intention to limit this invention entirely to this particular use. Obviously, the device which we have described may be adapted to other uses in other machines employing similarly reciprocating carriages. Also it is possible to make modifications in the construction of the various parts of our device without departing from the principle of our invention. It is not our desire to limit our inven-

tion otherwise than as set forth in the attached claims.

We claim:

1. In a reciprocating mechanism, a movable carriage, guide rods supporting said carriage, a pair of arms mounted for rotation on said carriage, said arms connected respectively to a pair of meshing spur gears whereby arcuate movement of one arm will cause equal but opposite movement of the other arm, a stop limiting the rotation of each arm, spring means carried by said gears tending to hold said arms alternately against their respective stops, an endless movable chain, an engaging element carried by said chain adapted to contact said arms, the arrangement and angular position of said arms with respect to each other being such that said element will engage only one arm at a time, and will make a complete cycle of travel before engaging the other of said arms.

2. In a reciprocating mechanism, a reciprocating carriage, guide rods supporting said carriage, a pair of arms mounted on said carriage for rotation in the same plane, said arms so connected that rotation of one will produce rotation of the other, stops limiting the rotation of said arms, an endless movable chain, an engaging element carried by said chain adapted to contact said arms, the arrangement and angular position of said arms with respect to each other being such that said element will first pass between said arms when said carriage reaches the limit of its travel in either direction, and will make a complete cycle of travel before again engaging either of the arms.

3. In a reciprocating mechanism, a horizontally reciprocating carriage, guide rods supporting said carriage, a pair of arms mounted on said carriage for rotation in a vertical plane, said arms connected respectively to a pair of meshing spur gears whereby arcuate movement of one arm will cause movement of the other arm, stops limiting the rotation of said arms, spring means carried by said gears tending to hold said arms alternately against their respective stops.

4. In a reciprocating mechanism, a reciprocating carriage, a pair of arms mounted for rotation on said carriage, means connecting said arms so constructed and arranged that arcuate movement of one arm will cause equal but opposite movement of the other arm, stops limiting the rotation of said arms, an endless movable chain, a motor rotating in only a single direction, said motor driving said chain, an engaging element carried by said chain adapted to contact said arms, the arrangement and angular

position of said arms with respect to each other being such that said element will engage only one arm at a time, and will make a complete cycle of travel before engaging the other of said arms.

5. In a reciprocating mechanism, a reciprocating carriage, a pair of arms rotatably mounted on said carriage, said arms connected respectively to a pair of meshing spur gears whereby arcuate movement of one arm will cause equal but opposite movement of the other arm, upper and lower stops limiting the rotation of said arms, respectively, means carried by said gears tending to hold an arm against a stop, an endless movable chain, a motor rotating in only a single direction, said motor driving said chain, an engaging element carried by said chain adapted to contact said arms, the arrangement and angular position of said arms with respect to each other being such that said element will engage only one arm at a time, and will make a complete cycle of travel before engaging the other of said arms.

6. In a reciprocating mechanism, a reciprocating carriage, a pair of arms rotatably mounted on said carriage, said arms connected respectively to a pair of meshing spur gears whereby arcuate movement of one arm will cause equal but opposite movement of the other arm, upper and lower stops limiting the rotation of said arms, respectively, an extension spring eccentrically attached to said spur-gears parallel to the center line of said gears, said spring exerting a constant inward pull on said gears whereby, when said spring is positioned below said center line, the spring will act to hold said arms at one limit of their rotation and, when positioned above said center line, will act to hold said arms at the other limit of their rotation.

7. In a reciprocating mechanism, a reciprocating carriage, a pair of arms mounted on said carriage for partial rotation in the same plane, means connecting said arms so constructed and arranged that arcuate movement of one arm will cause equal but opposite movement of the other arm, a pair of stops limiting the rotation of said arms respectively, an endless movable chain, means for driving said chain, an engaging element carried by said chain, the arrangement and angular position of said arms with respect to each other being such that said element on said chain will engage only one arm at a time, will pass between said arms when said carriage reaches the limit of its travel in either direction, and will make a complete cycle of travel before engaging the other of said arms.

JOSEPH H. HEGINBOTHAM.
LEWIS V. STANLEY.