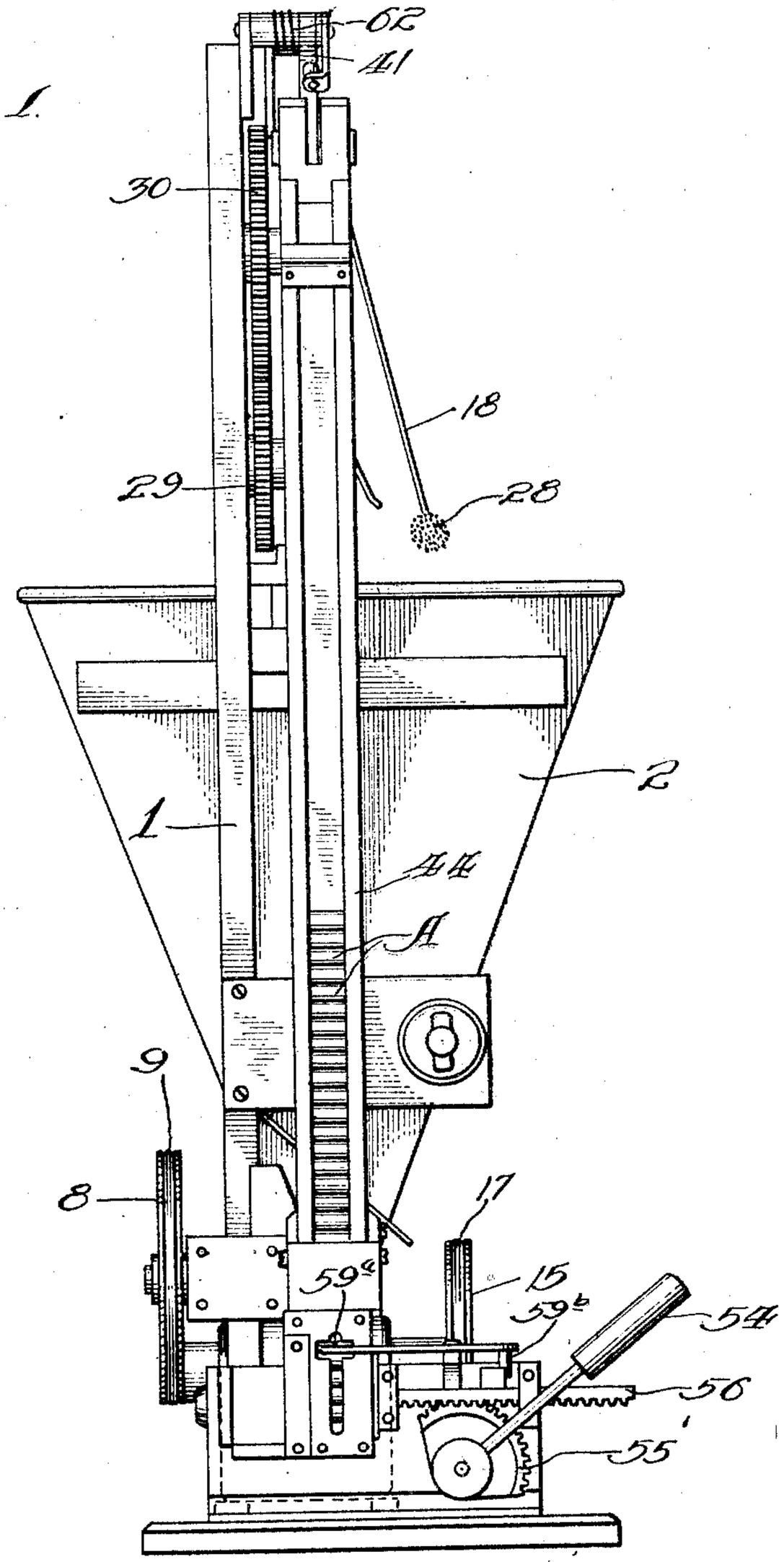
Sept. 4, 1928. 1,682,819

F. D. WILLI

HAIRPIN BOX MACHINE

Original Filed March 15, 1923 6 Sheets-Sheet 1

Fig. 1.



Witness:
Stephen A. Mebora

Inventor:
Frederick D. Willi,
by Frank L. Belknap, Atty

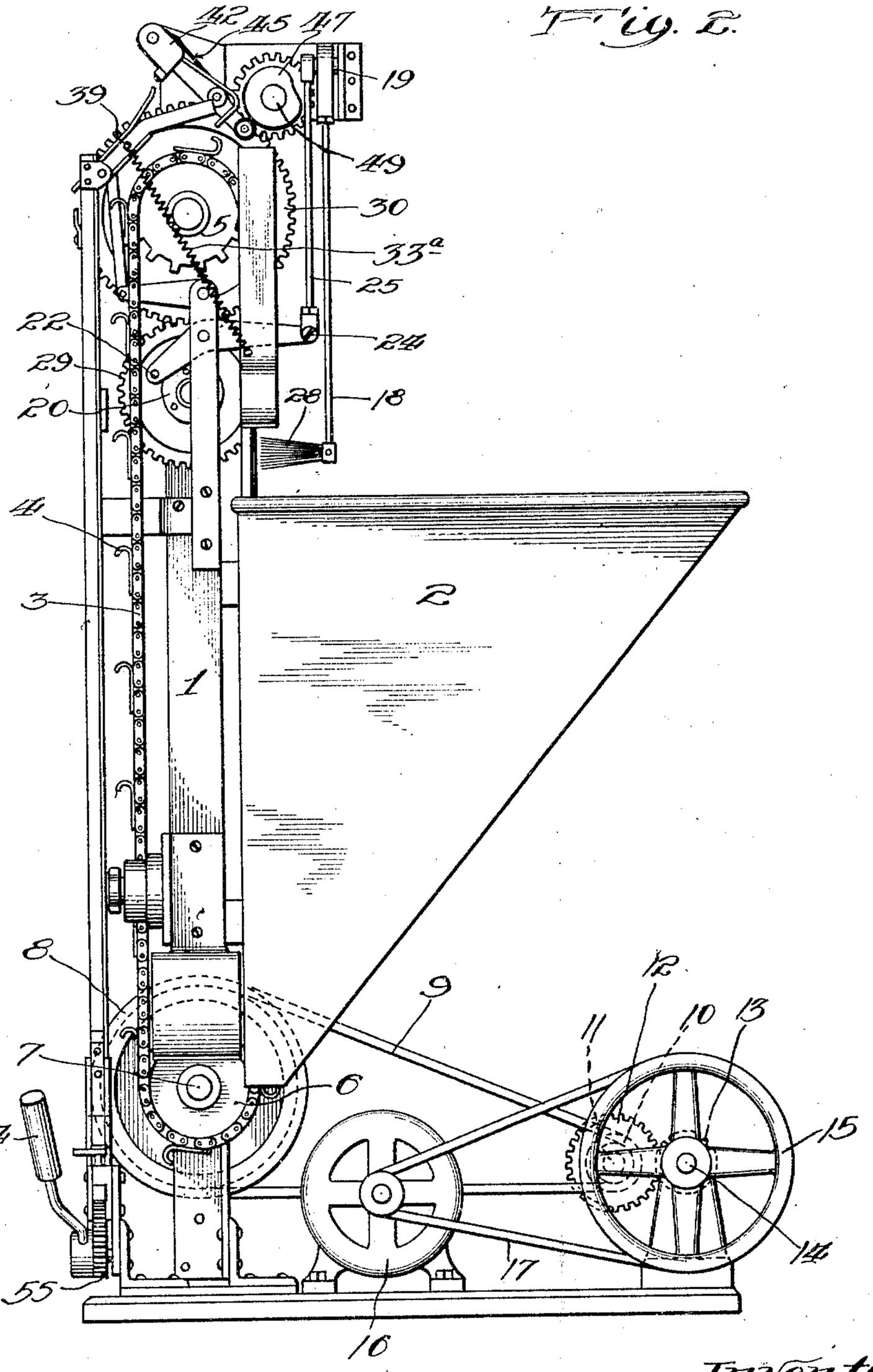
Sept. 4, 1928. 1,682,819

F. D. WILLI

HAIRPIN BOX MACHINE

Original Filed March 15, 1923 6 Sheets-Sheet 2

Fig. 2.



Witness:
Stephen J. Rebora

Inventor:
Frederick D. Willi,
by Frank L. Belknap Atty

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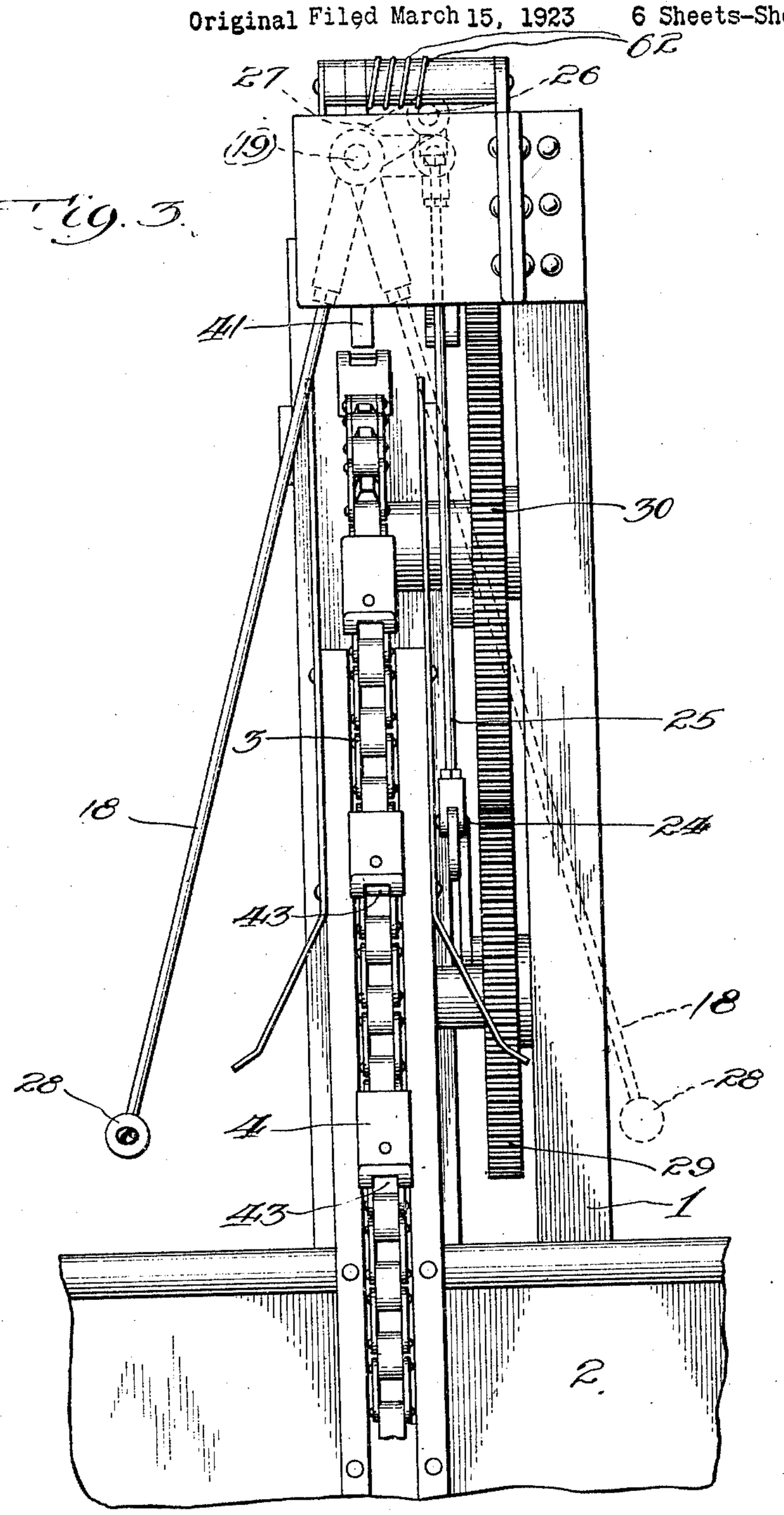
F. D. WILLI

HAIRPIN BOX MACHINE

Original Filed March 15, 1923 6 Sheets-Sheet 3

Fig. 3.



Witness:
Stephen S. Kebra

Inventor:
Frederick D. Willi,
By Frank L. Belknap. Atty.

Sept. 4, 1928. 1,682,819

F. D. WILLI

HAIRPIN BOX MACHINE

Original Filed March 15, 1923 6 Sheets-Sheet 4

Fig. 4

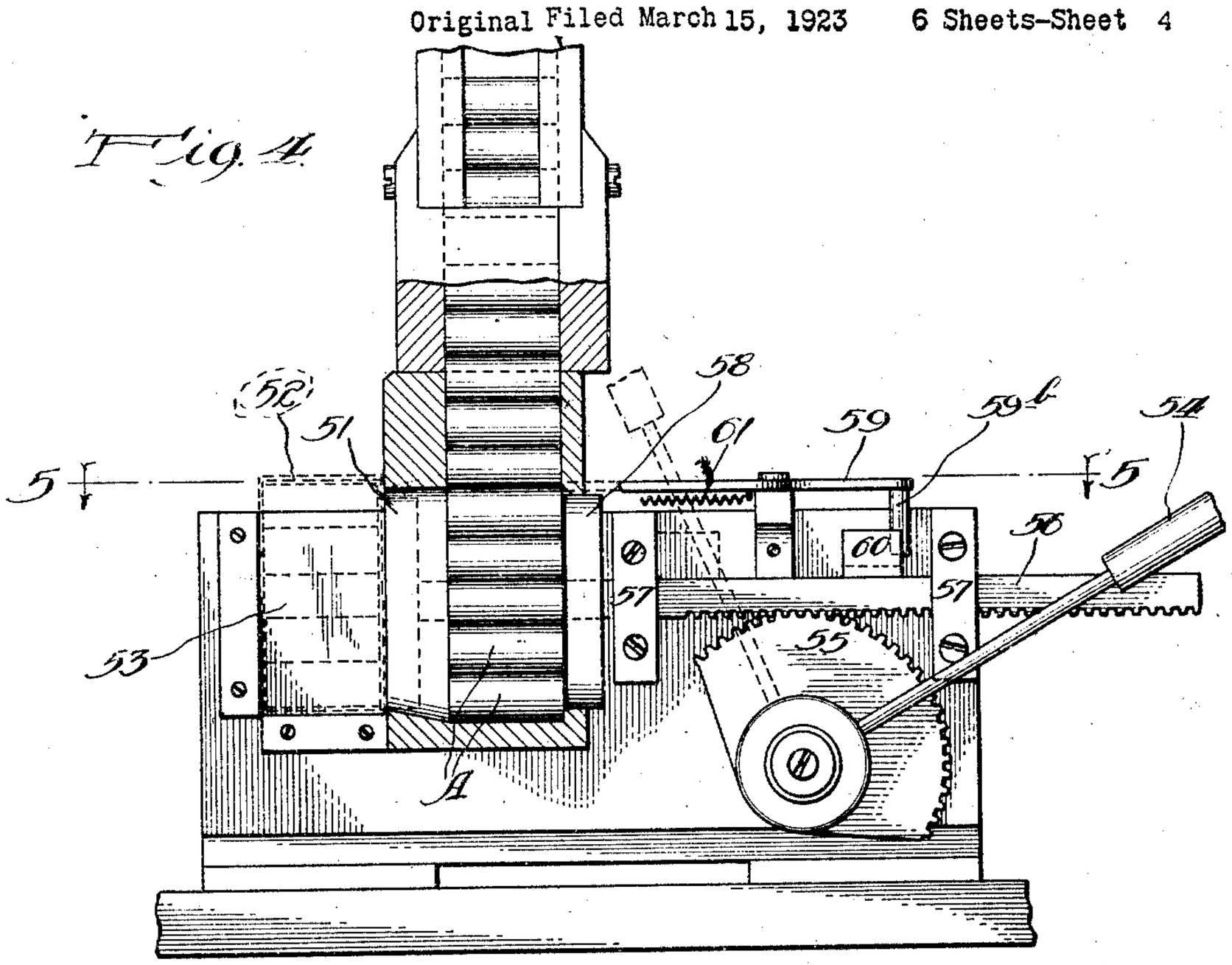


Fig. 5.

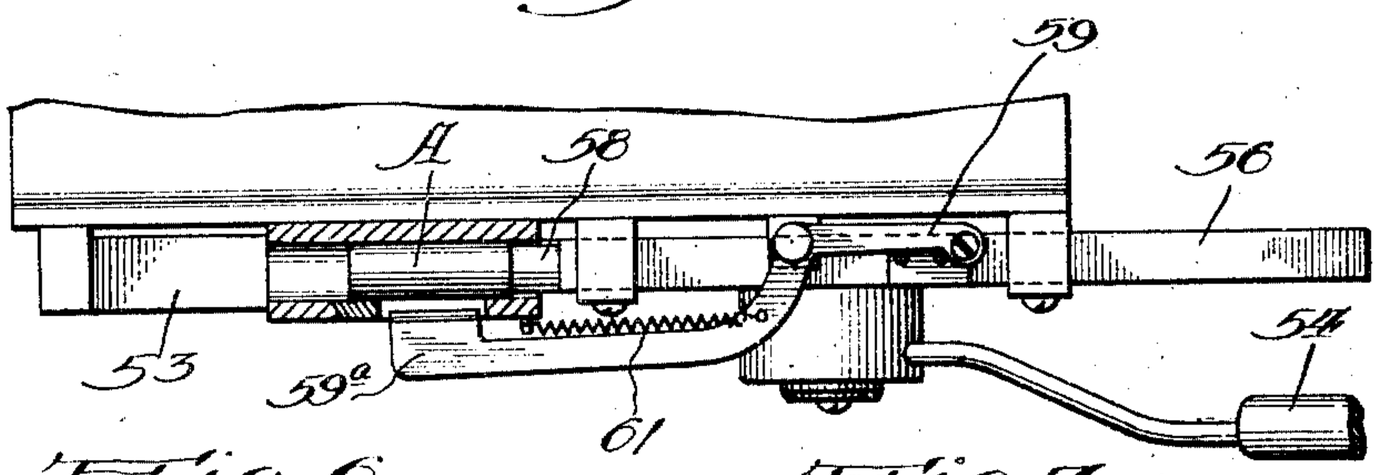


Fig. 6.

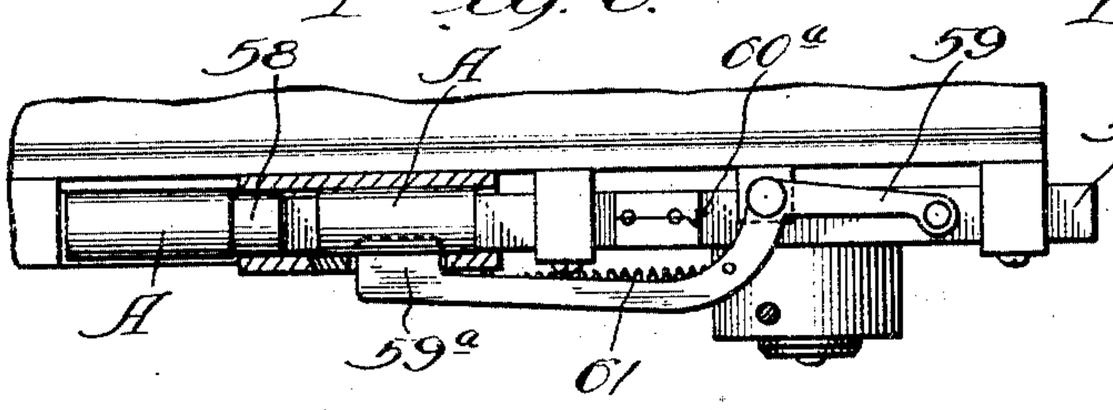
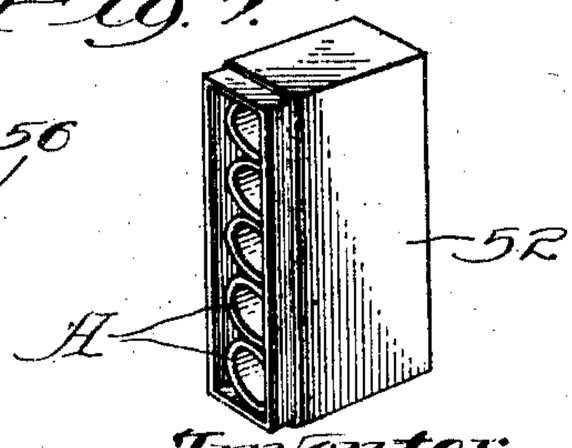


Fig. 7.



Witness:

Stephen V. Rebora

Inventor
Frederick D. Willi,
by Frank L. Belknap. Atty.

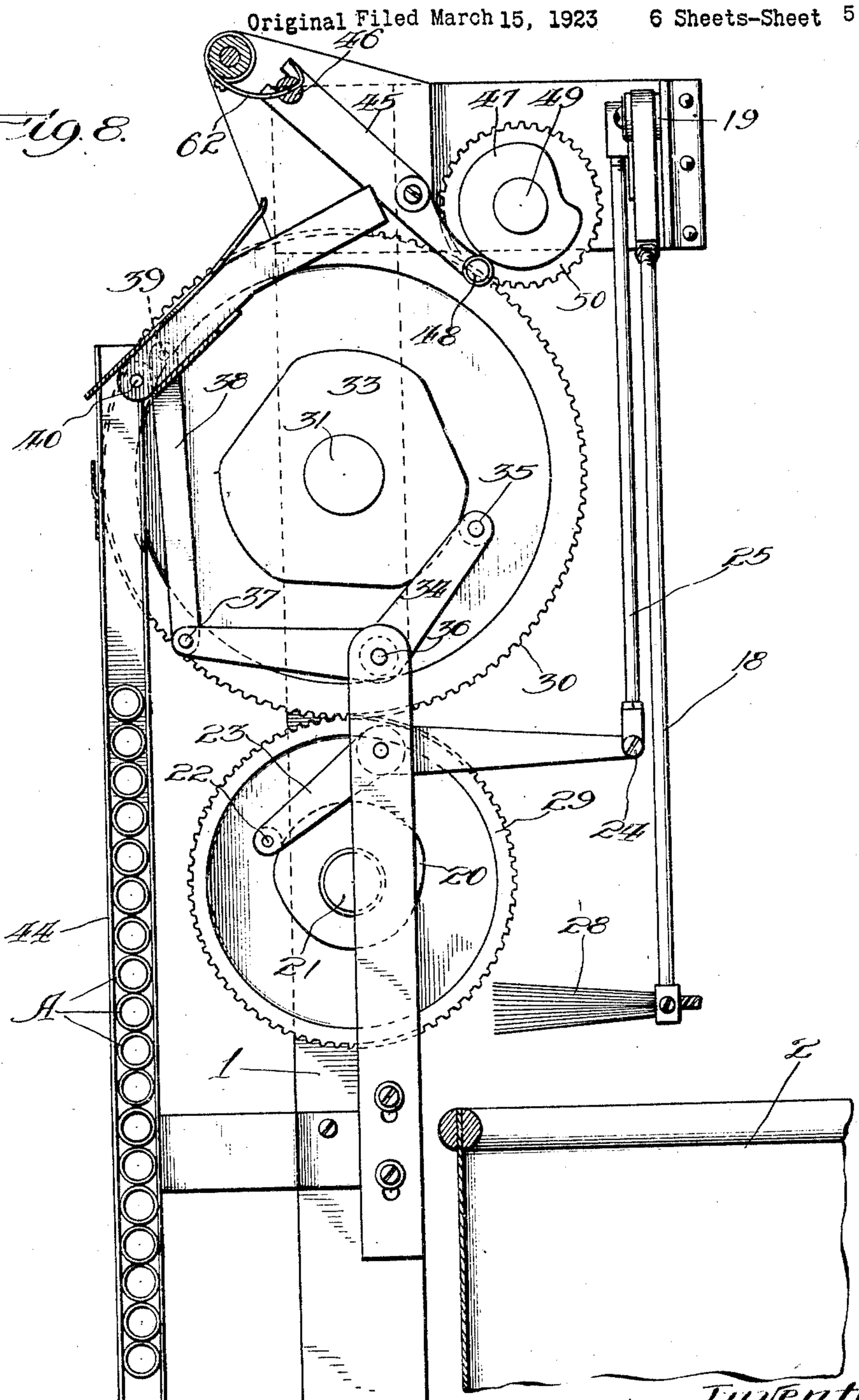
Sept. 4, 1928. 1,682,819

F. D. WILLI

HAIRPIN BOX MACHINE

Original Filed March 15, 1923 6 Sheets-Sheet 5

Fig. 8.



Witness:
Stephen J. Kebora

Inventor:
Frederick D. Willi,
by Frank L. Belknap Atty.

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F. D. WILLI

HAIRPIN BOX MACHINE

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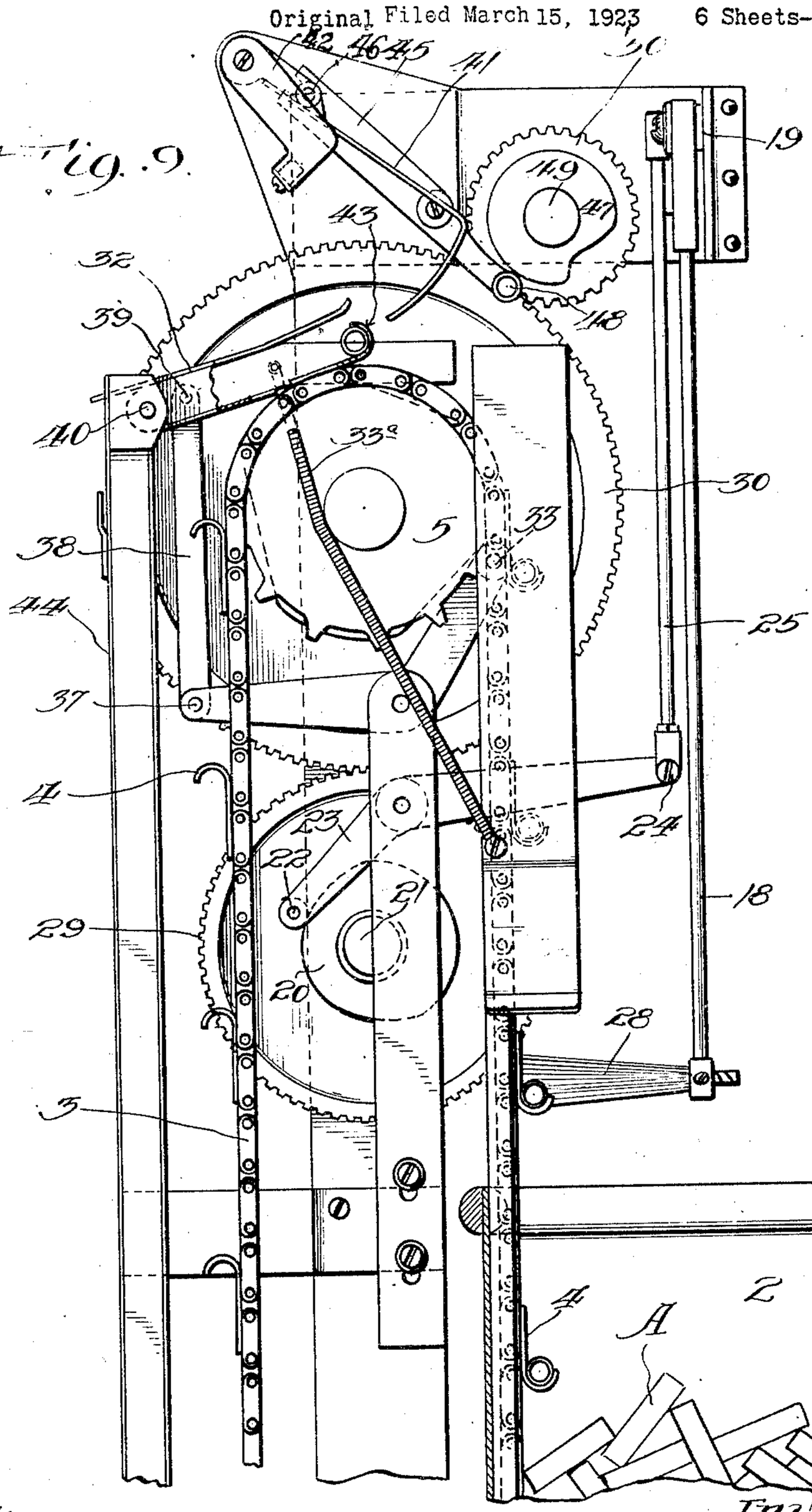
Fig. 9.



Witness:
Stephen J. Kebora

Inventor:
Frederick D. Willi,
by Frank L. Belknap. Atty.

Patented Sept. 4, 1928. 1,682,819

UNITED STATES PATENT OFFICE.

FREDERICK D. WILLI, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE HUMP HAIRPIN MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF WEST VIRGINIA.

HAIRPIN-BOX MACHINE.

Application filed March 15, 1923, Serial No. 625,231. Renewed February 16, 1928.

This invention relates to improvements in hairpin box machines, and refers more particularly to a machine for inserting tubes or tube compartments into hairpin boxes.

Among the salient objects of the invention are to provide a machine in which tubes or compartments are automatically removed from a hopper and inserted in a traveling mechanism through which they pass and are inserted into boxes; to provide a mechanism which obviates the necessity of manually inserting the compartments into boxes and reduces labor and the cost of producing the partition boxes.

Fig. 1 is a front view of the machine.

Fig. 2 is a side view showing the drive.

Fig. 3 is a detail showing the oscillating brush and conveyor.

Fig. 4 is an enlarged fragmentary detail of the inserting mechanism.

Fig. 5 is a view taken along the line 5—5 in Fig. 4.

Fig. 6 is a detail of the retaining mechanism for holding the column of tubes while a selected number are inserted into boxes.

Fig. 7 is a perspective of the box with the tubes inserted.

Fig. 8 is a side view with parts broken away to show the functioning of the cams operating the oscillating brush and pivoted receiver chute.

Fig. 9 is a side elevational view with parts broken away to show the conveyor and oscillating brush mechanism.

Briefly, the mechanism functions as follows:

From a hopper containing tube compartments, the tubes are picked up by the carriers of a conveyor which deposits them at the top of a machine into a pivoted chute through which they pass by gravitation to a vertical chute or feed chute which supplies the tubes to a box by means of a slidable inserting machine or plunger manually operated, which forces the tubes into the open box positioned along the side of the chute.

The function of the oscillating brush is to prevent the tubes from being positioned other than in a horizontal position on the carriers while at the top of the mechanism. An ejector shoe or finger oscillates in timed relation with the pivoted receiver chute to positively remove the tubes from the carriers.

During the ejection from the feed chute into the box the column of tubes in the feed chute are supported by an automatically inserted arm.

Referring in detail to the drawings, at the rear on the standard 1 is mounted a hopper 2 which contains the cylindrical tube compartments A which are to be inserted into the hairpin boxes. A conveyor chain 3 having hook shaped carriers 4 positioned at regular intervals along the outside of the conveyor chain, operates over the upper and lower sprocket wheels 5 and 6. The lower sprocket wheel 6 is mounted upon a shaft 7, to which is also fixed a pulley wheel 8 which is driven through a pulley 9 by a smaller wheel 10 mounted upon the shaft 11. A gear 12 mounted upon the same shaft meshes with a pinion 13 fixed upon the shaft 14 upon which is also mounted the pulley wheel 15.

This latter pulley wheel is driven by the motor 16 through the belt 17.

The driven conveyor during its upward travel passes through the hopper 2 where each carrier picks up a single tube carrying it to the top of the machine where it is deposited in the receiver chute, hereinafter explained.

On the rear of the machine positioned above the hopper, is an oscillating rod 18 pivoted at 19, shown in Figs. 1, 2, 3, 8 and 9. The oscillation of this rod is produced by means of a cam 20 mounted upon the shaft 21. The cam surface contacts a cam roller 22 mounted upon a bell crank 23 which has its opposite end connected at 24 to a rod 25. This latter member is connected at 26, shown in Fig. 3 to an upper arm 27 also pivoted at 19 and functioning to produce the oscillation of the rod 18 upon which the brush 28 is mounted. This oscillation or pendulum movement causes the brush to pass back and forth above the carriers preventing a tube from remaining in a vetrical position in the carrier. It is essential that the operation of the brush be kept in timed relation with the conveyor chain so that the brush swings in front of each carrier at the

proper moment. Any of the tubes which do not lie horizontally in the carriers, will be brushed back into the hopper.

The cam 20 mounted on a shaft 21 is driven by a gear 29 meshing with the gear 30 on the shaft 31. This latter gear is mounted upon the same shaft as the sprocket wheel 5.

When the tubes arrive at a position at the top of the travel of the conveyor chain, or in a position shown in Fig. 9, the pivoted receiver chute 32 is lowered, due to the action of the triangular cam 33 operating against the spring tension imposed by the spring 33ª functioning the pivoted bell crank 34 by means of a cam roller 35 contacting the cam surface.

The bell crank 34 is pivoted at 36 to a portion of the standard or frame 1 and its opposite end is connected at 37 to the bar connection 38 which is pivoted at 39 to the receiver chute 32. This chute as explained, is pivoted at 40 and is oscillated vertically so as to accept a tube from each of the carriers as they successively come to a position at the top of the conveyor as shown in Fig. 9.

The purpose of oscillating this receiver chute is to remove the chute from the path of the travel of the conveyor carriers as they move around the sprocket in their downward travel.

To assure the removal of the tubes from the carrier, an ejector rod 41 mounted upon the pivoted crank 42 is oscillated in timed relation with the functioning of the receiver chute so that the ejector is inserted through the aperture 43 in the back of the carriers. Thus the ejector pushes the tubes into the chute through which they are fed to the vertical feed chute 44. The ejector rod 41 as explained is mounted upon a pivoted member 42 which has connection with a pivoted bifurcated member 45. The bifurcated portion of this member fits about the bearing portion 46 of the element 42 and oscillates the ejector with the rocking of the pivoted member 45 caused by the action of the cam 47 against the cam roller 48 mounted on the opposite end of the member 45 from the bifurcated portion. The cam 47 is mounted upon a shaft 49 upon which is also mounted a gear 50 which meshes with the gear 30 driven as previously explained, by the sprocket wheel 5.

The tubes dropping into the feed chute build up in a manner shown in Figs. 1 and 8, the bottom tubes being positioned before a side opening 51 in the side of the chute before which is positioned a box 52 such as that shown in Fig. 7. The box is held in the rectangular space 53 and may be of any desired size according to the size of the box into which the tubes or compartments are to be fitted. In a like manner the aperture 51 may be varied in size in order that the proper number and proper size tubes can be inserted in the open side of the box.

The boxes are manually positioned in the cavity 53 and the pivoted arm 54 rotated about the dotted line position shown in Fig. 4. The stub shaft to which the arm 54 is attached, has mounted thereon a sector 55 meshing with the rack 56 which is supported by cleats 57. At the end of the rack is a plunger 58 which contacts the ends of the tubes and forces them through a tapered opening 51 slightly compressing them so as to hold the compartments firmly in the box after they have been inserted.

Simultaneously with the functioning of the rack and plunger 58, the pivoted retaining arm 59 is released from behind the block 60 with the forward movement of the rack, and due to the action of the spring 61 acting upon the arm it is drawn to a position shown in Fig. 6 where the enlarged flat end 59ª is inserted between the top of the upper tube to be inserted into the box and the surface of the lowest tubes in the chute. Thus, this separating or supporting arm retains the tubes and prevents their dropping behind the plunger before it is returned to the position shown in Fig. 4 behind the next set of tubes to be inserted in the box.

When the plunger has been returned by moving the handle 54 from the dotted line position to the full line position shown in Fig. 4, the tapered edge 60ª of the block 60 mounted upon the top of the rack contacts the depending pin 59ᵇ attached to the underside of the arm 59. This rocks the arm on its pivot and removes the flattened enlarged surface 59ª from beneath the column of tubes in the chute, thus permitting the tubes to fall to the bottom of the chute as shown in Fig. 4, and in a position where the next succeeding set may be pushed by the plunger into the box held in the cavity 53.

A coil spring 62 maintains the ejector rod in a position shown in Fig. 9, when not oscillated forward by the action of the cam 47. This spring also keeps the cam roller against the surface of the cam 47.

The mechanism may be continuously operated to insert a set of tube compartments in a hairpin box such as that shown in Fig. 7. Heretofore, it has been necessary to manually assemble and place the tubes in the box, an operation which is not only difficult, but expensive. This mechanism makes it possible to insert the compartments in a much shorter period of time and more accurately than can be done by hand.

The mechanism is not restricted to this particular use, but may be applied as well to the insertion of different shapes and types

of compartments which are to be inserted in boxes of different character.

I claim as my invention:

1. In a machine of the character described, in combination a container for box partitions, a chute, a traveling conveyor for transferring the partitions from the container to the chute, an intermediate pivoted element between the conveyor and chute functioning in timed relation with the conveyor to transfer the partitions from the conveyor to the chute, and means for positively ejecting the partitions from the conveyor carriers into the intermediate element.

2. In a machine of the character described, in combination, a container for box partitions, a chute, upright conveying means having spaced retaining elements for transporting partitions from the container to the chute and means for preventing the partitions from being in a position other than horizontal while carried by the conveying means.

3. In a machine of the character described, in combination a container for box partitions, a chute, a traveling conveyor for transferring the partitions from the container to the chute, an intermediate element between the conveyor and chute functioning in timed relation with the conveyor to transfer the partitions from the conveyor to the chute, and means for positively ejecting the partitions from the conveyor carriers into the intermediate element.

4. In a machine of the character described, in combination a container for box partitions, a chute, a traveling conveyor for transferring the partitions form the container to the chute, an intermediate element between the conevyor and chute functioning in timed relation with the conveyor to transfer the partitions from the conveyor to the chute, and means for positively ejecting the partitions from the conveyor carriers into the intermediate element, an oscillating brushing means intermittenly contacting the conveyor for removing partitions improperly placed on the conveyor.

5. In a machine of the character described, in combination, a container for box partitions, a chute, a traveling conveyor for transferring the partitions from the container to the chute, an intermediate element between the conveyor and chute functioning in timed relation with the conveyor to transfer the partitions from the conveyor to the chute, means for positively ejecting the partitions from the conveyor carriers into the intermediate element, and simultaneously operable means for retaining the partitions at rest in the chute while partitions are being inserted into a box.

FREDERICK D. WILLI.