

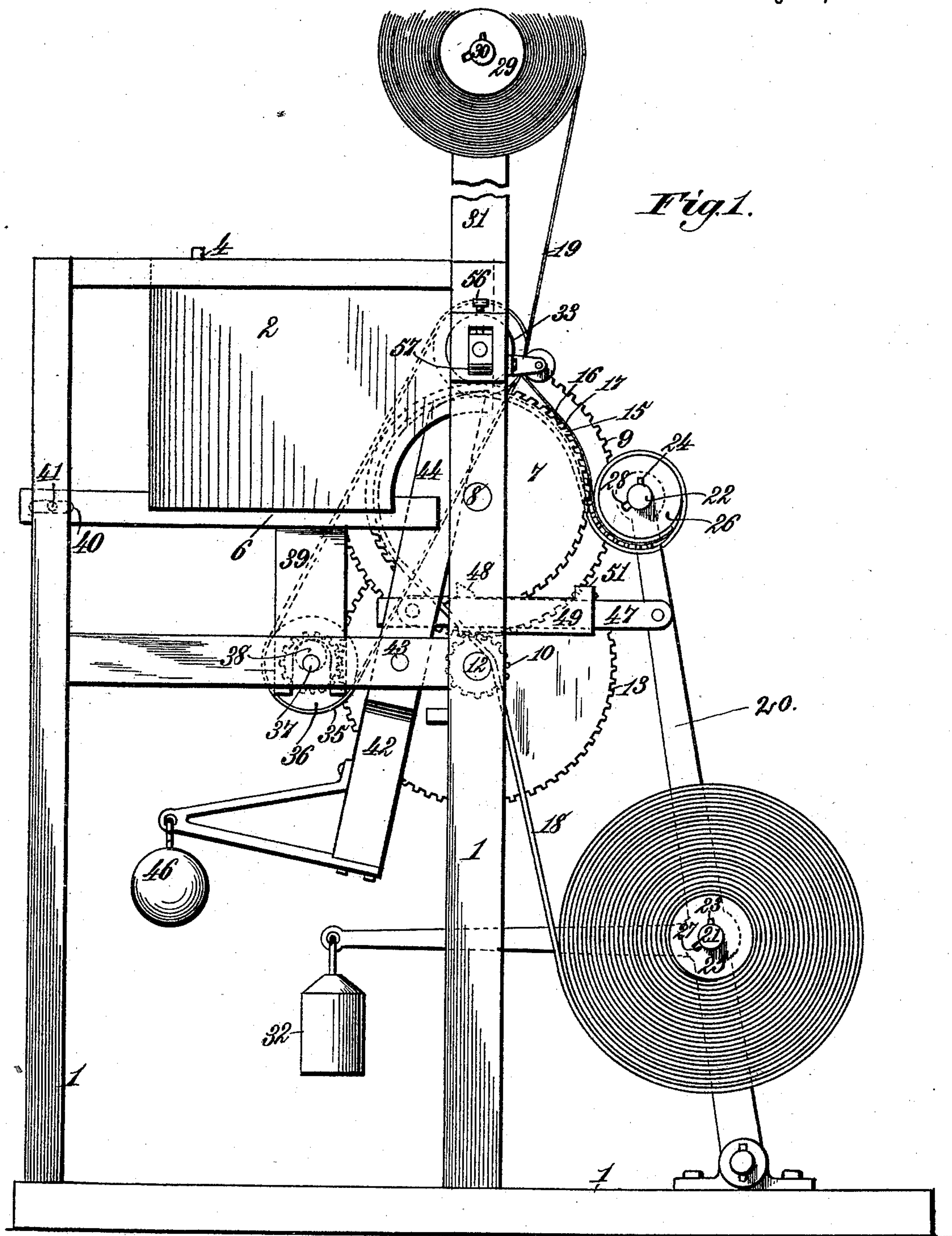
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3 Sheets—Sheet 1.

E. H. EISENHART.  
MATCH BUNCHING MACHINE.

No. 500,872.

Patented July 4, 1893.



Witnesses.  
*John G. Smith,*  
*A. H. Norris.*

Inventor.  
*Edward H. Eisenhart.*  
By  
*James L. Norris.*  
*Atty.*

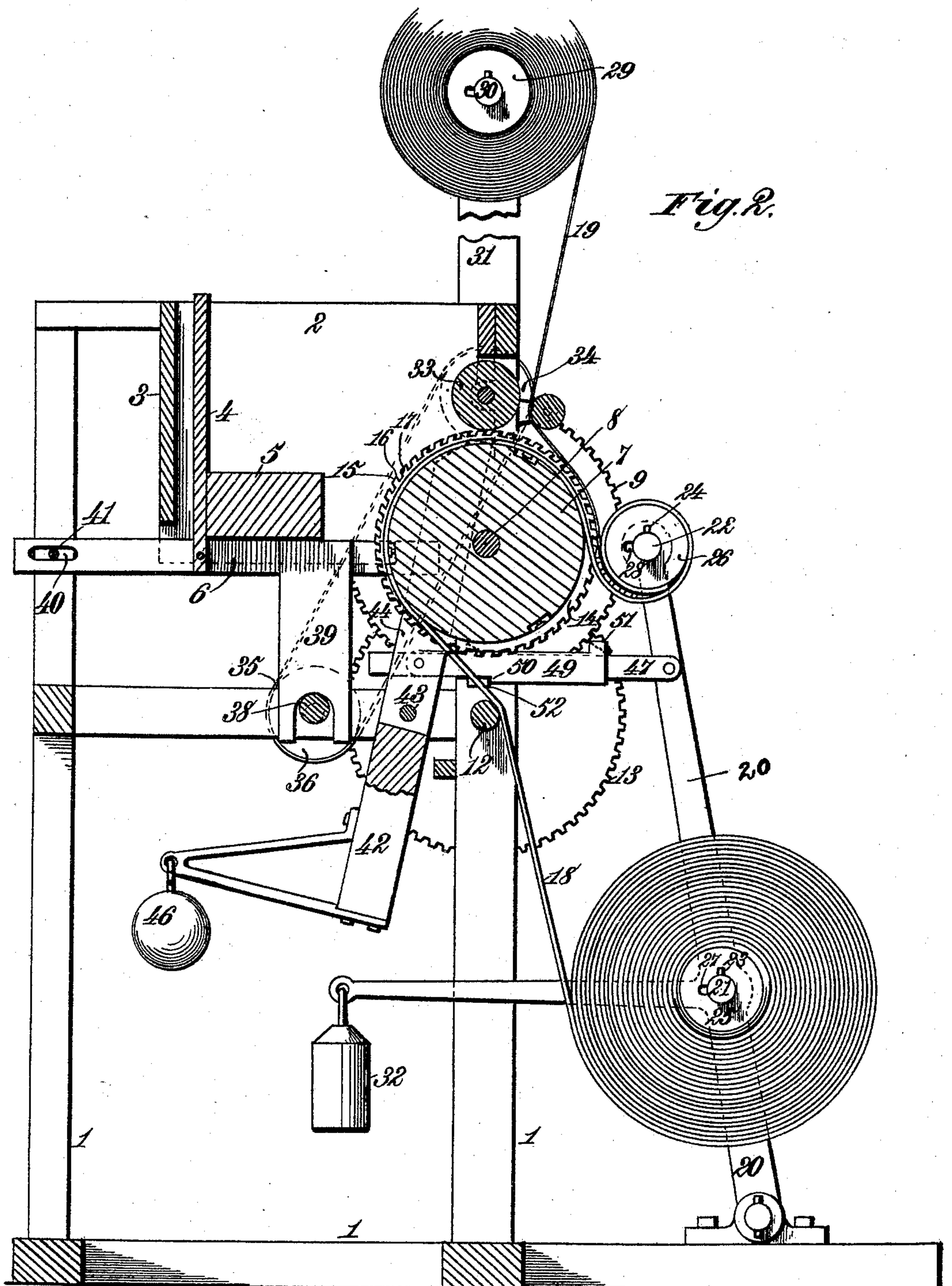
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3 Sheets—Sheet 3.

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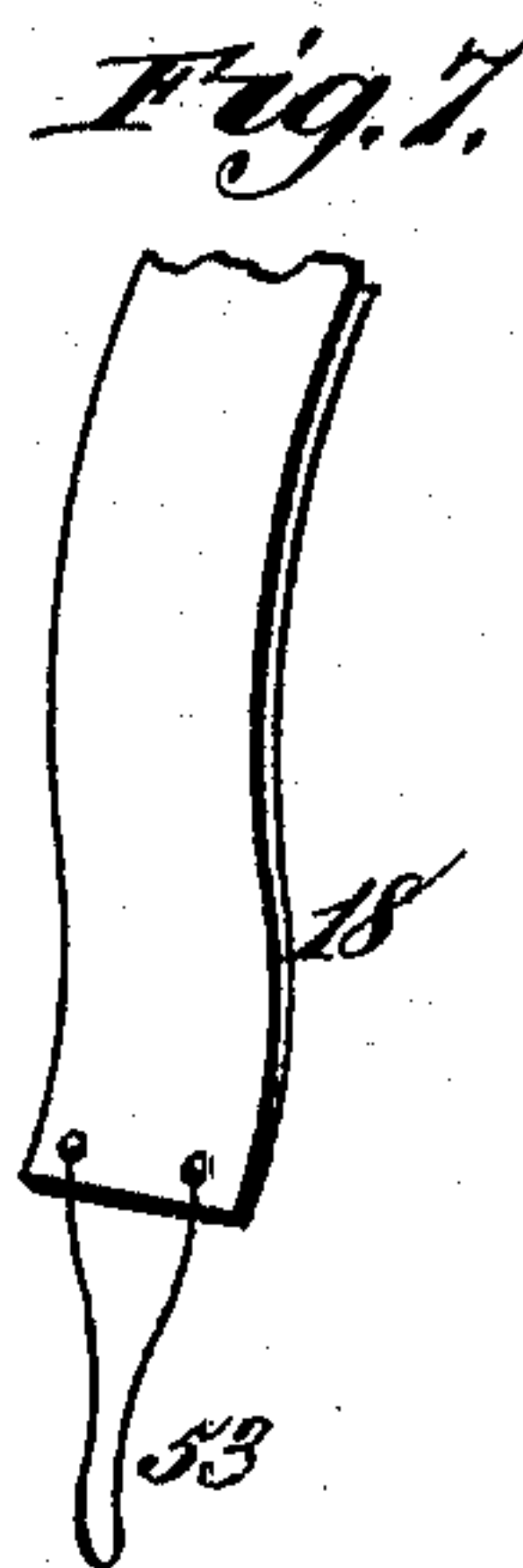
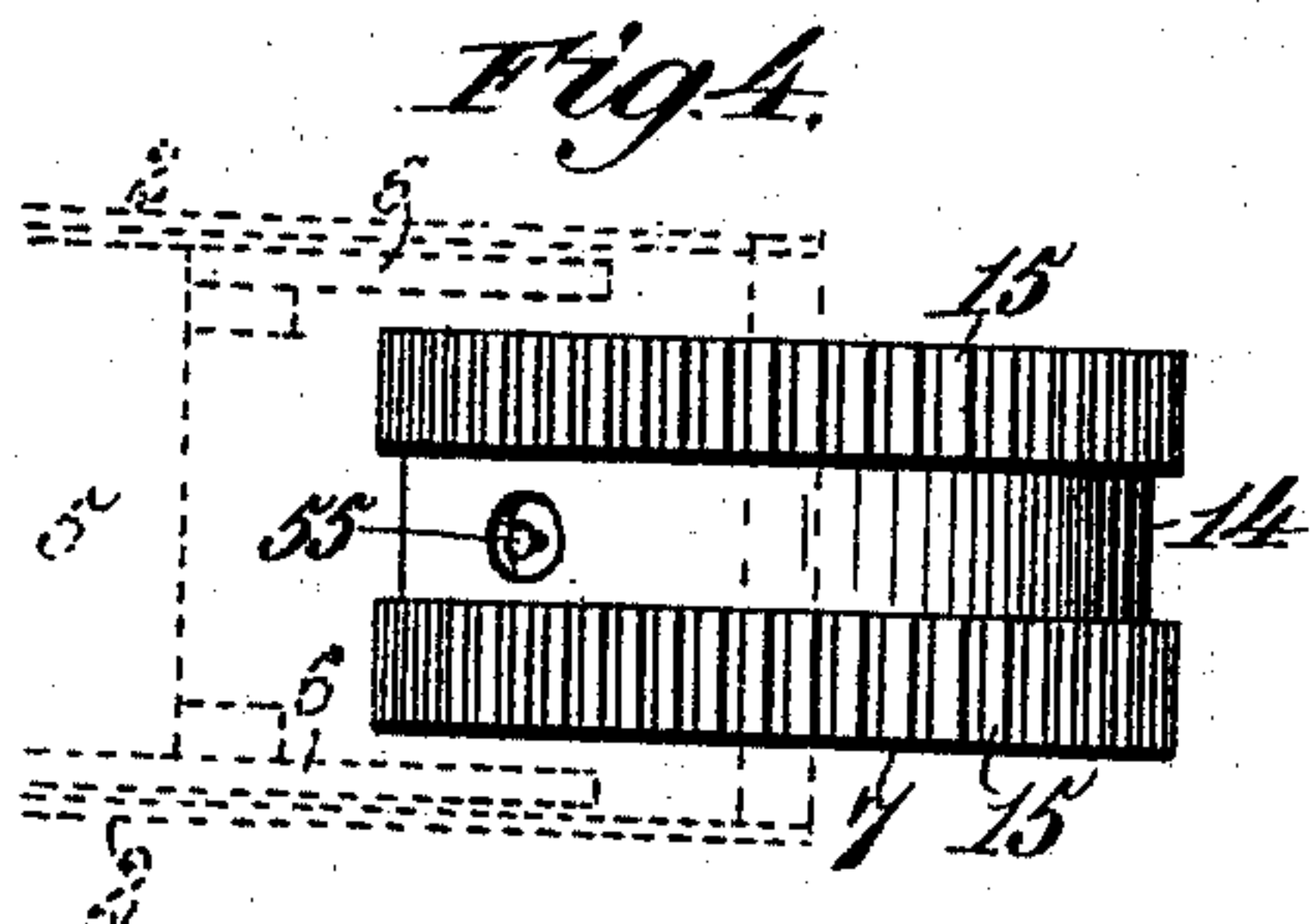
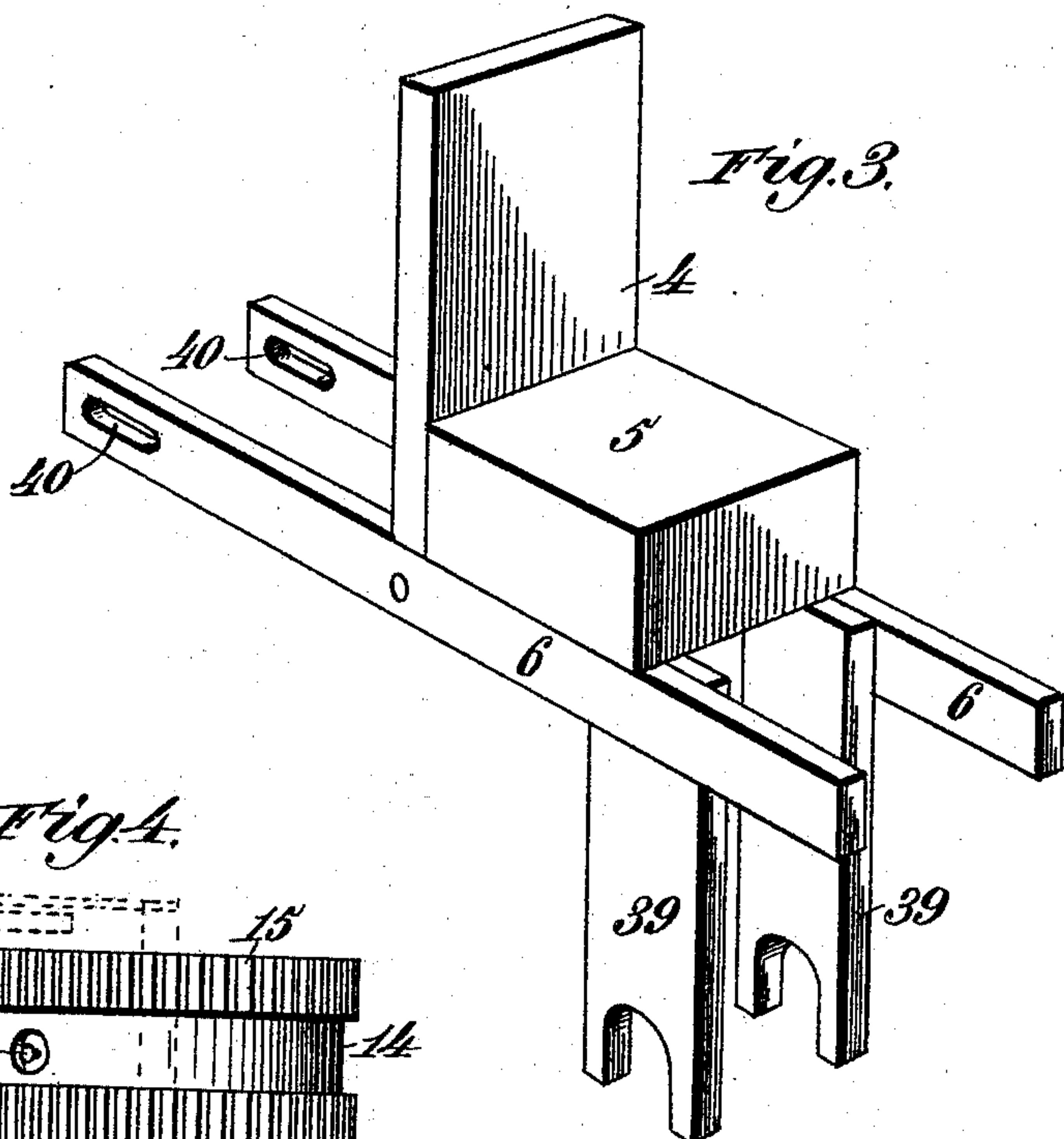


Fig. 5.

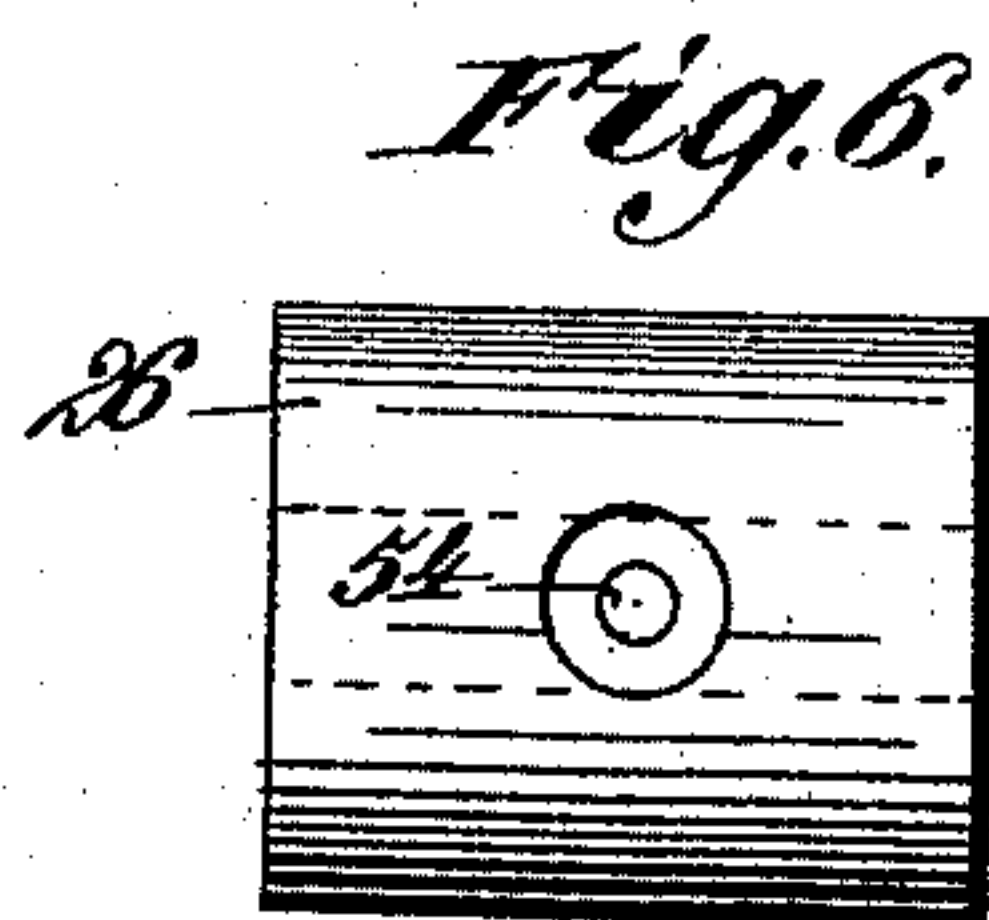
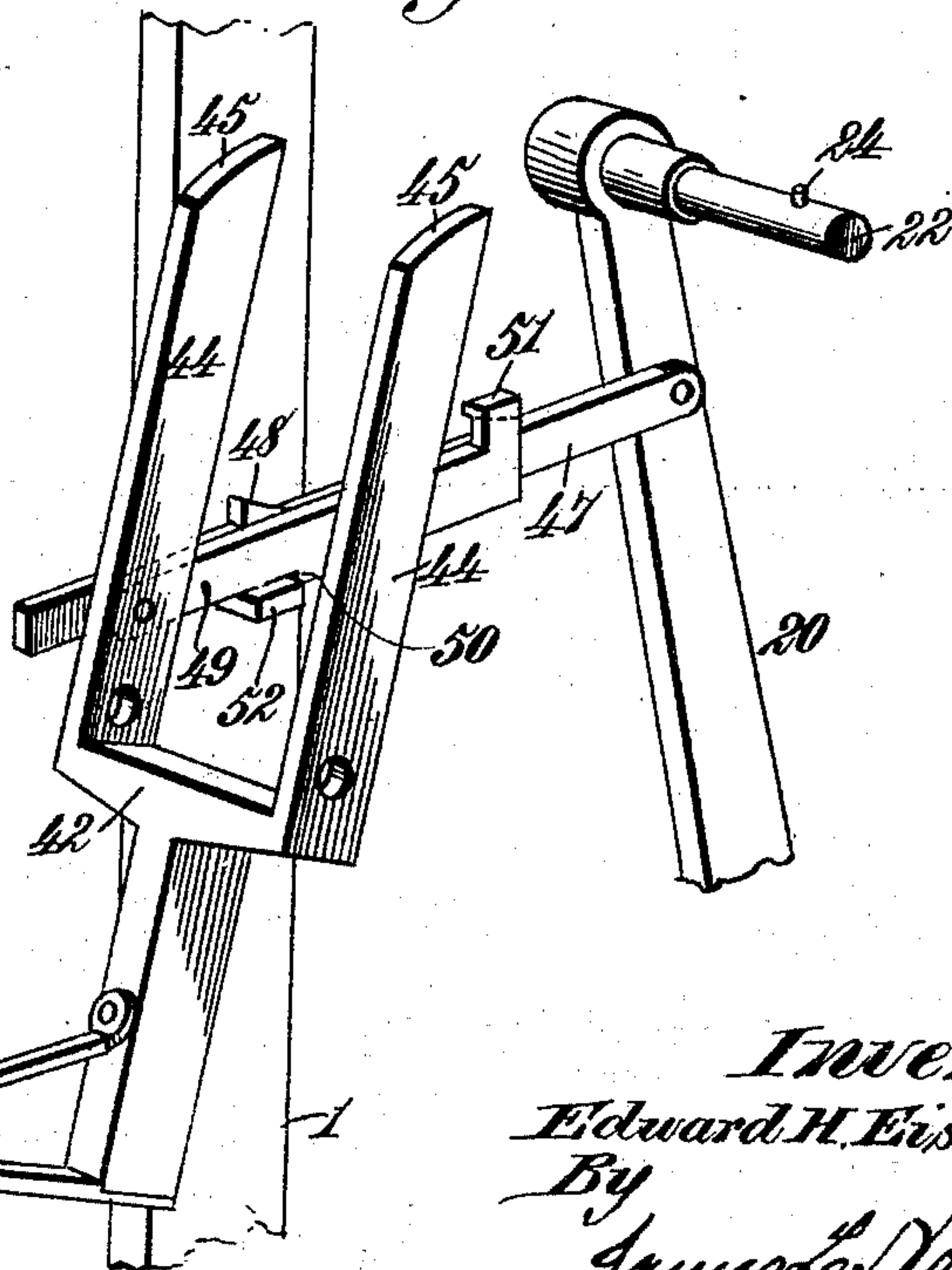


Fig. 8.



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# UNITED STATES PATENT OFFICE.

EDWARD H. EISENHART, OF NEW YORK, N. Y.

## MATCH-BUNCHING MACHINE.

SPECIFICATION forming part of Letters Patent No. 500,872, dated July 4, 1893.

Application filed January 16, 1893. Serial No. 458,535. (No model.)

*To all whom it may concern:*

Be it known that I, EDWARD H. EISENHART, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented new and useful Improvements in Match-Bunching Machines, of which the following is a specification.

This invention relates to machines for bunching match sticks between coiled webs or tapes for the purpose of dipping or heading the sticks, and the objects of my invention are to improve and simplify machines of this class; to provide a novel construction of wheel for taking the match sticks from the hopper, whereby the sticks are prevented from being accidentally displaced after they are taken up by the wheel and prior to being removed therefrom by the rolling up bands or tapes; to provide novel devices for agitating and straightening the match sticks in the hopper, and to provide novel means for clearing the match sticks from the wheel after the bands or tapes have been wound up to form a bunch, so that the wheel can continue its rotation without taking up match sticks from the hopper.

To accomplish all these objects my invention involves the features of construction and the combination or arrangement of devices hereinafter described and claimed, reference being made to the accompanying drawings, in which—

Figure 1, is a side elevation of sufficient of a match bunching machine to illustrate my invention. Fig. 2, is a vertical sectional view of the same. Fig. 3, is a detail perspective view of the movable part of the hopper for agitating and straightening the match sticks. Fig. 4, is a plan view of the toothed wheel for taking the match sticks from the hopper, portions of the machine being indicated by dotted lines. Fig. 5, is a detail perspective view of the oscillatory frame for clearing the match sticks from the wheel after the bands or tapes have been wound up to form a bunch, portions of the frame-operating devices being also illustrated. Fig. 6, is a plan view of the take-up roll for the bands or tapes. Fig. 7, is a detail view of an end portion of one of the bands or tapes to show the loop by which it may be engaged with the wheel or with the

take-up roll; and Fig. 8, is a broken detail view showing a modified construction of toothed wheel.

In order to enable those skilled in the art to make and use my invention I will now describe the same in detail, referring to the drawings wherein—

The numeral 1 indicates a main frame of any construction suitable for the purpose and having at its upper portion fixed walls 2 and 3, which, in connection with the movable wall 4, block 5 and parallel bars 6, constitute a hopper in which the match sticks are placed. The wheel 7 for taking the match sticks from the hopper is mounted on a shaft 8, having a spur gear 9, meshing into a pinion 10, on a shaft 12 which is rotated by a driving gear 13, so that the latter transmits motion to the wheel 7. The wheel 7 which receives the match sticks from the hopper is provided with a central groove 14, Fig. 4, at each side of which is an annular rim provided with teeth 15, the side walls 16 and 17, Figs. 1 and 2, of which are arranged at angles to the radii of the wheels so that the outer portions of the teeth extend over or overhang the match sticks when the latter enter the notches for the purpose of preventing the accidental displacement of the sticks as they are carried upward in transit to the point where they are removed from the wheel by the bands or tapes 18 and 19. This specific construction of toothed wheel is very desirable in a match bunching machine, in that the match sticks are pocketed as it were in the wheel and all liability of the sticks being accidentally displaced prior to being intentionally removed from the wheel by the bands or tapes is entirely avoided.

To the base of the main frame is pivoted the lower end of a swinging arm 20, provided with two laterally projecting cylindrical studs 21 and 22, provided near their outer ends with lugs 23 and 24. The lower band or tape roller 25 is loosely journaled on the stud 21, and the take-up roller 26 is loosely journaled on the stud 22, each of said rollers being provided with a longitudinal groove as at 27 and 28, for the purpose of applying the rollers to the studs 21 and 22 in position so that the rollers lie between the swinging arm 20 and the lugs 23 and 24. By this means the rollers



25 and 26 cannot become displaced during the operation of the machine and at the same time these rollers are free to rotate on fixed studs, in which respect they differ from those match machines wherein the axles or shafts of the rollers are rigidly connected therewith so that all rotate together. The construction described with reference to the rollers 25 and 26 applies to the roller 29, of the band or tape 19, said roller 29 being journaled on a fixed cylindrical stud 30 projecting from a standard 31 rising from the main frame.

The band or tape 18 is carried around and over the wheel 7 and lies in the groove 14 of said wheel and the two bands or tapes 18 and 19 are engaged with the take-up roller 26, so that the match sticks received by the teeth 15 of the wheel 7 are carried between the two tapes and are removed from the wheel and wound into a bunch for the purpose of dipping or heading in a well known manner.

The take-up roller 26 is rotated by frictional contact of the toothed wheel 7 with the circumference of the roll being formed on the take-up roller and as this roll increases in diameter the arm 20 can swing outward, said arm being provided with a suitable weight 32 which tends to constantly press the roll being formed against the periphery of the toothed wheel 7.

A rotary clearer wheel 33, of metal, rubber, or other suitable material, is journaled above the toothed wheel 7 for throwing the match sticks back into the hopper and thus preventing the passage of an undue quantity of sticks to the point where the sticks are removed from the wheel by the bands or tapes. This clearer wheel is an element common in match bunching machines and therefore requires no further explanation. The shaft of the clearer wheel is provided with a pulley 34, connected by a belt 35, with a pulley 36, mounted on a shaft 37, Fig. 1, which is provided with a cam or eccentric 38, shown by dotted lines in Fig. 1, and by full lines in Fig. 2, in such manner that the clearer wheel is driven by the pulley 36. The shaft 37 is geared to the driving wheel 13 as in Fig. 1, and consequently this driving wheel not only imparts motion to the toothed wheel 7, but also transmits motion to the shaft 37 and clearer wheel 33.

The cam 38 is embraced by the bifurcated lower ends of arms 39, depending from the parallel side bars 6, Fig. 3, which side bars are provided at one end with slots 40, loosely engaging a shaft 41 carried by the main frame so that said parallel side bars can reciprocate lengthwise. The cam 38 imparts a horizontal reciprocating motion and also a rising and falling motion to the arms 39, and consequently the parallel bars 6, block 5 and vertical wall 4 are correspondingly moved for the purpose of agitating and straightening the match sticks in the hopper. The main body of match sticks is supported by the block 5 and they fall on to the parallel side bars 6

from which they are taken up by the toothed wheel 7.

After the tapes or bands 18 and 19 have been wound to form the required bunch, it is desirable to stop the feed of the matches without stopping the rotation of the toothed wheel 7, and to accomplish this object in a very simple manner I provide an oscillatory clearer frame 42, mounted on a shaft 43 and having a forked upper end, the arms 44 of which fork embrace the toothed wheel 7 and have their upper extremities curved as at 45, Fig. 5. The clearer frame is acted upon at its lower end by a weight 46 or any equivalent contrivance which will tend to constantly press the upper extremities 45 in a direction toward the center of the hopper, but normally the clearer frame is locked in the position represented by Figs. 1 and 2 so that it cannot operate as a clearer to remove the match sticks from the toothed wheel prior to such sticks passing to the point where the bands or tapes take the sticks from the toothed wheel. The locking mechanism referred to comprises a rod 47 pivoted to the swinging arm 20 and provided with a tappet or cam 48, Fig. 5, and a rod 49 pivoted to one of the arms 44 and provided with a shoulder 50 and a lateral projection 51. The projection 51, as here shown, is arranged at one end of the rod 49 and the shoulder 50 is arranged intermediate the ends of the said rod for the purpose of engaging a fixed lug 52 secured to a part of the main frame. By this construction the rod 47 is gradually moved outward as the diameter of the bunch increases and when the diameter reaches a certain limit, *i. e.*, when the tapes or bands 18 and 19, are nearly wound, the tappet or cam 48 acts on the projection 51 and lifts the shoulder 50 from engagement with the lug 52 so that the weight 46 or other suitable contrivance swings the clearer frame 42 and causes the curved extremities 45 to move into such position that all match sticks taken up by the teeth of the wheel 7 are removed from the teeth prior to reaching the clearer wheel 33. It will be obvious that the feed of the match sticks is thus cut off without stopping the rotation of the toothed wheel.

To apply new tapes or bands in the machine, or, as it may be technically termed, to rethread the machine, I provide the ends of each band or tape with loops, as at 53, Fig. 7, to engage a projection 54 on the take-up roller 26, Fig. 6, or a projection 55 on the toothed wheel 7. The number of projections 43 and 55 may be such as to meet the conditions required and each projection may be composed of a headed screw, hook or nail inserted into position so that the loop 53 can be readily engaged therewith. By this means a loop such as 53 at one end of the band or tape 18 may be engaged with one of the projections 55 on the toothed wheel 7 and the latter will carry the tape around into proper position so that the attendant can then disengage said loop from



the projection of the toothed wheel and engage it with the projection 54 on the take-up roller 26. A loop such as 53 on the band or tape 19 may also be engaged with the projection 54 on the take-up roller 26 for the purpose of properly winding this band or tape.

In the modified construction of toothed wheel represented by Fig. 8 the notches are of dove-tailed form but the side walls 15<sup>a</sup> and 16<sup>a</sup> are at angles to the radii of the wheel so that substantially the same result is attained as regards accidental displacement of the match sticks as is attained by the construction shown in Figs. 1 and 2. The important feature of the construction as regards the toothed wheel resides in the fact that the side walls of the teeth are arranged at angles, preferably obtuse angles to the radii of the wheel, in which respect my invention differs from those match bunching machines wherein the side walls of the teeth of the receiving wheel are parallel with the radii of said wheel.

The position of the circumference of the clearer wheel 33 relatively to the circumference of the toothed wheel 7 can be varied by any suitable means such as an adjusting screw 56 and a series of removable and replaceable plates 57, Fig. 1, which plates are located beneath the boxing for the shaft of the clearer roller and one or more of which plates can be removed to lower the wheel or other plates inserted to raise the wheel if the set screw be properly adjusted as will be obvious.

Having thus described my invention, what I claim is—

1. In a match-bunching machine, the combination of a supporting or main frame, a hopper provided with a horizontally sliding and rising and falling bottom having slot and shaft connections with the supporting or main frame, cam-mechanism for horizontally reciprocating and raising and lowering the hopper bottom, a toothed wheel rotating in the lower portion of the hopper and taking the match sticks therefrom, and means for winding the match sticks into a bunch, substantially as described.

2. In a match-bunching machine, the combination with a supporting or main frame, of a hopper, a hopper bottom comprising side bars having slot and shaft connections with the supporting or main frame and reciprocating in vertical and horizontal planes, cam-mechanism for horizontally and vertically reciprocating the side bars of the hopper bottom, a toothed wheel revolving in the lower portion of the hopper and taking the match sticks therefrom, means for winding the match sticks into a bunch, a pivoted clearer frame having a forked end embracing the toothed wheel and between which the latter revolves, mechanism for holding the forked end of the clearer frame normally inoperative, means for releasing the said holding mechanism, and a device for swinging the clearer frame when

the holding mechanism is released, substantially as described.

3. In a match bunching machine, the combination of a hopper having a horizontally reciprocating and rising and falling bottom portion, a toothed wheel which takes the match sticks from said bottom portion, cam-mechanism for horizontally reciprocating and raising and lowering the said hopper bottom, supporting guides for the latter, a take-up roller, and means for winding the match sticks into a bunch, substantially as described.

4. In a match bunching machine, the combination of a hopper having a horizontally reciprocating and rising and falling bottom portion, a toothed wheel which takes the match sticks from said bottom portion, a take-up roller, bands or tapes engaging the take-up roller and one of which passes over the toothed wheel, and means for rotating the toothed wheel and reciprocating and raising and lowering the hopper bottom, substantially as described.

5. In a match bunching machine, the combination of a hopper comprising suitable walls and having a reciprocating and rising and falling bottom portion composed of a wall 4, block 5 and parallel bars 6, arms 49 connected with the parallel bars, a rotary cam 38 engaging said arms, and means for taking the match sticks from the hopper bottom and bunching them, substantially as described.

6. In a match bunching machine, the combination with a hopper comprising suitable walls and a reciprocating and rising and falling bottom portion, of arms 39 secured to said hopper bottom, a rotary cam engaging said arms and operating to reciprocate and raise and lower the hopper bottom, a toothed wheel which takes the match sticks from said hopper bottom, and means for rolling the match sticks into a bunch, substantially as described.

7. In a machine for bunching match sticks, the combination with a suitable hopper, a toothed wheel which takes the match sticks from the hopper, a swinging arm carrying a rotary take-up roll, and bands or tapes connected with the take-up roll, of an oscillatory clearer frame, a rod 49 connected with the clearer frame and provided with a lateral projection 51 and shoulder 50, a rod 47 connected with the swinging arm and provided with a tappet or cam 48, and a fixed locking lug 52 with which the shouldered bar engages for holding the clearer frame normally out of operative position, substantially as described.

8. In a match bunching machine, the combination with non-rotary cylindrical studs 21, 22 and 30 having projecting lugs, of the rollers 25, 26 and 29 loosely mounted on said studs and having recesses to pass over said lugs, the tapes or bands 18 and 19, the toothed



wheel 7, and the hopper, substantially as described.

9. The combination with the toothed wheel and the take-up roll of a match bunching machine, each provided with a projecting pin, of the bands or tapes each having a loop at one extremity for engaging the said projecting pins, substantially as described.

In testimony whereof I have hereunto set my hand and affixed my seal in presence of two subscribing witnesses.

EDWARD H. EISENHART. [L. S.]

Witnesses:

ALBERT H. NORRIS,  
GEO. W. REA.