

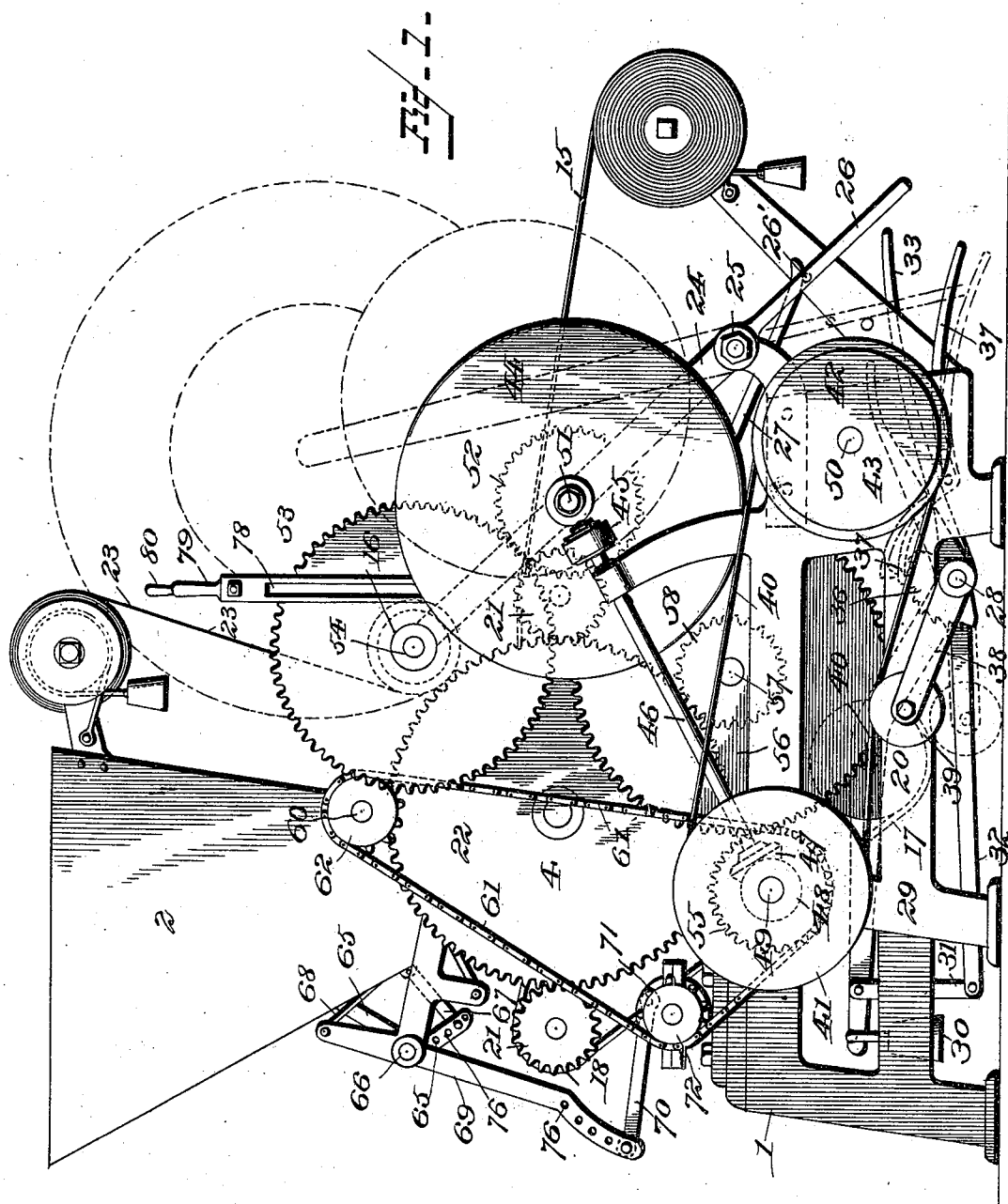
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5 Sheets—Sheet 1.

M. MOUL.
MACHINE FOR BUNCHING MATCH STICKS.

No. 502,909.

Patented Aug. 8, 1893.



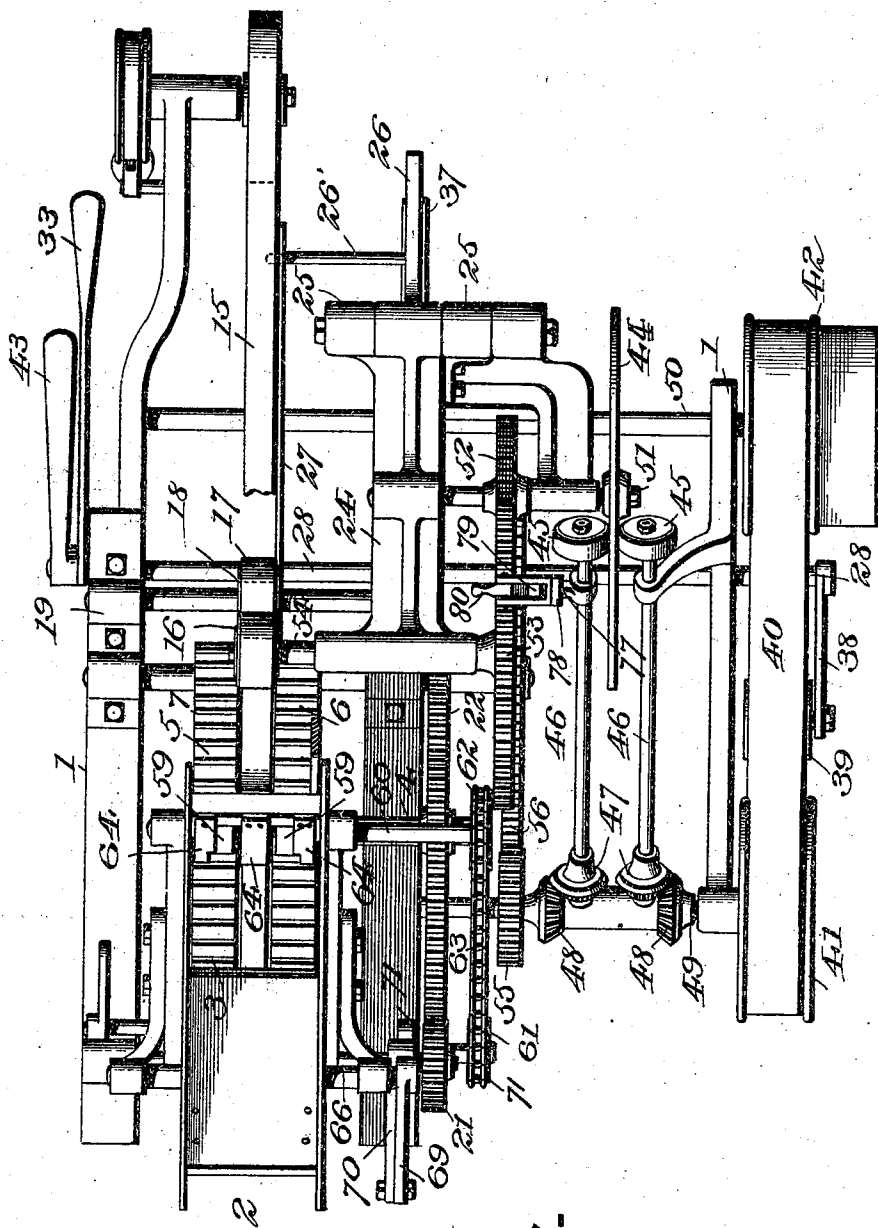
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(No Model.)

5 Sheets—Sheet 2.

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Fig. 2.

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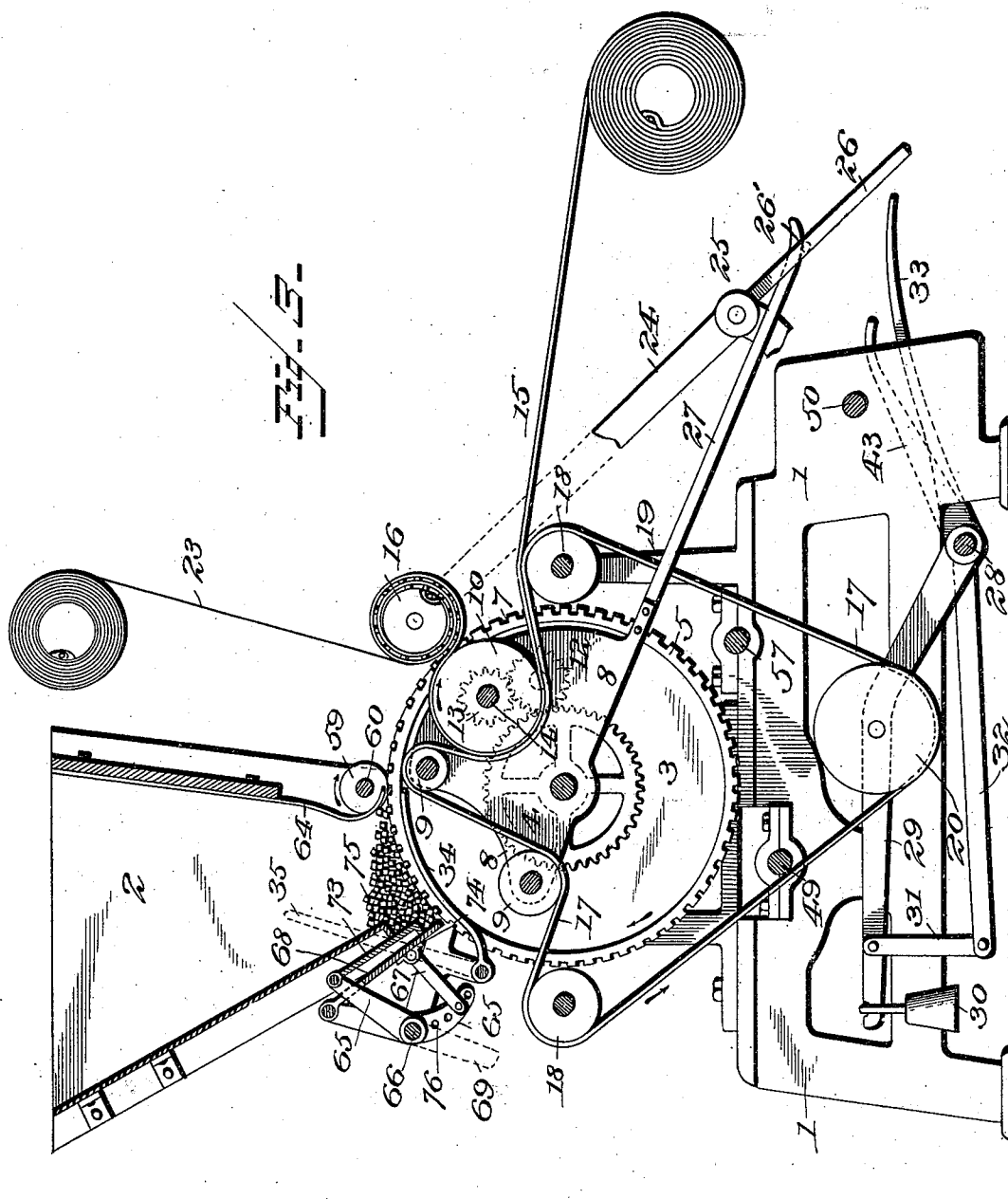
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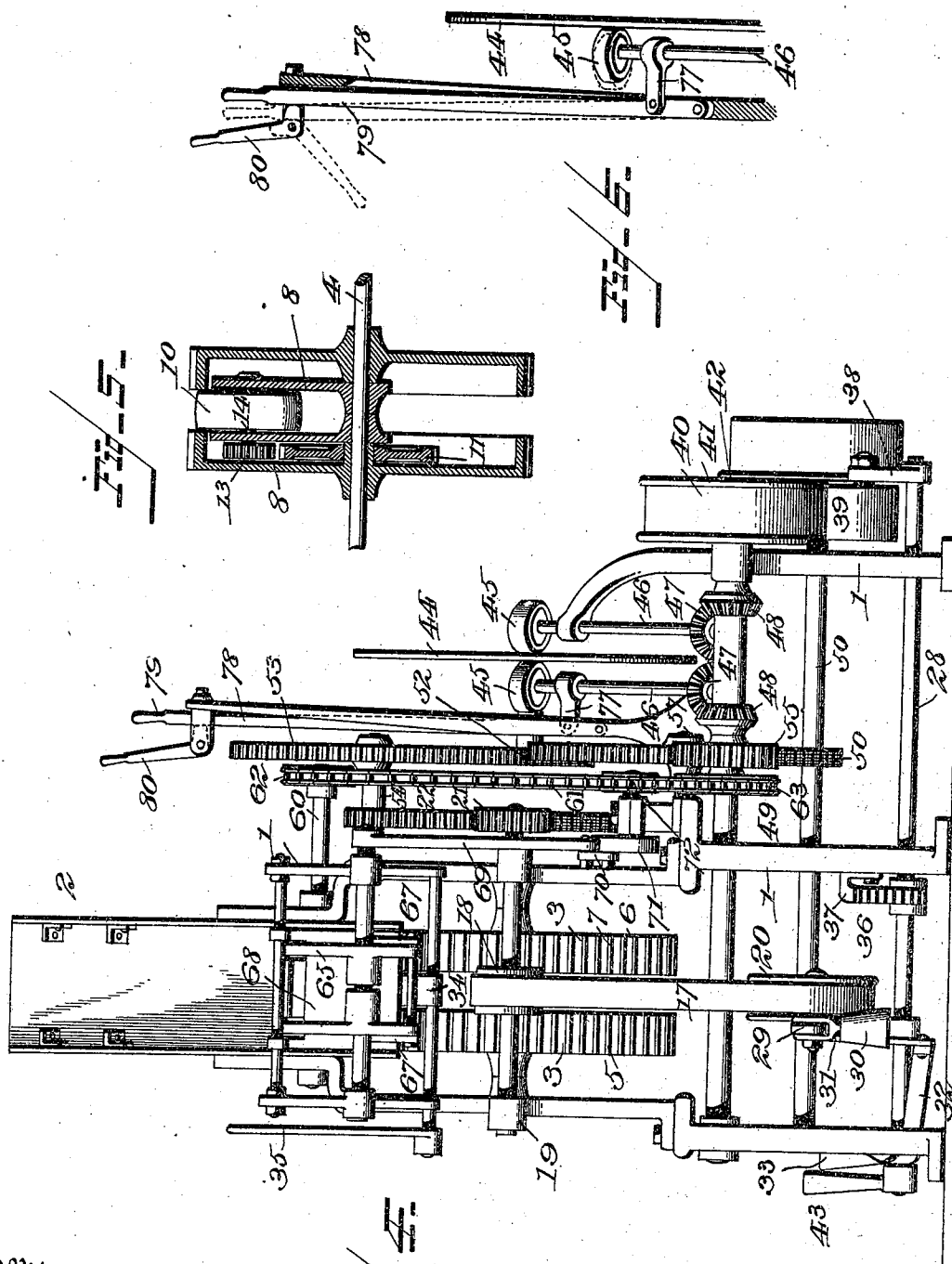
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(No Model.)

5 Sheets—Sheet 4.

M. MOUL.
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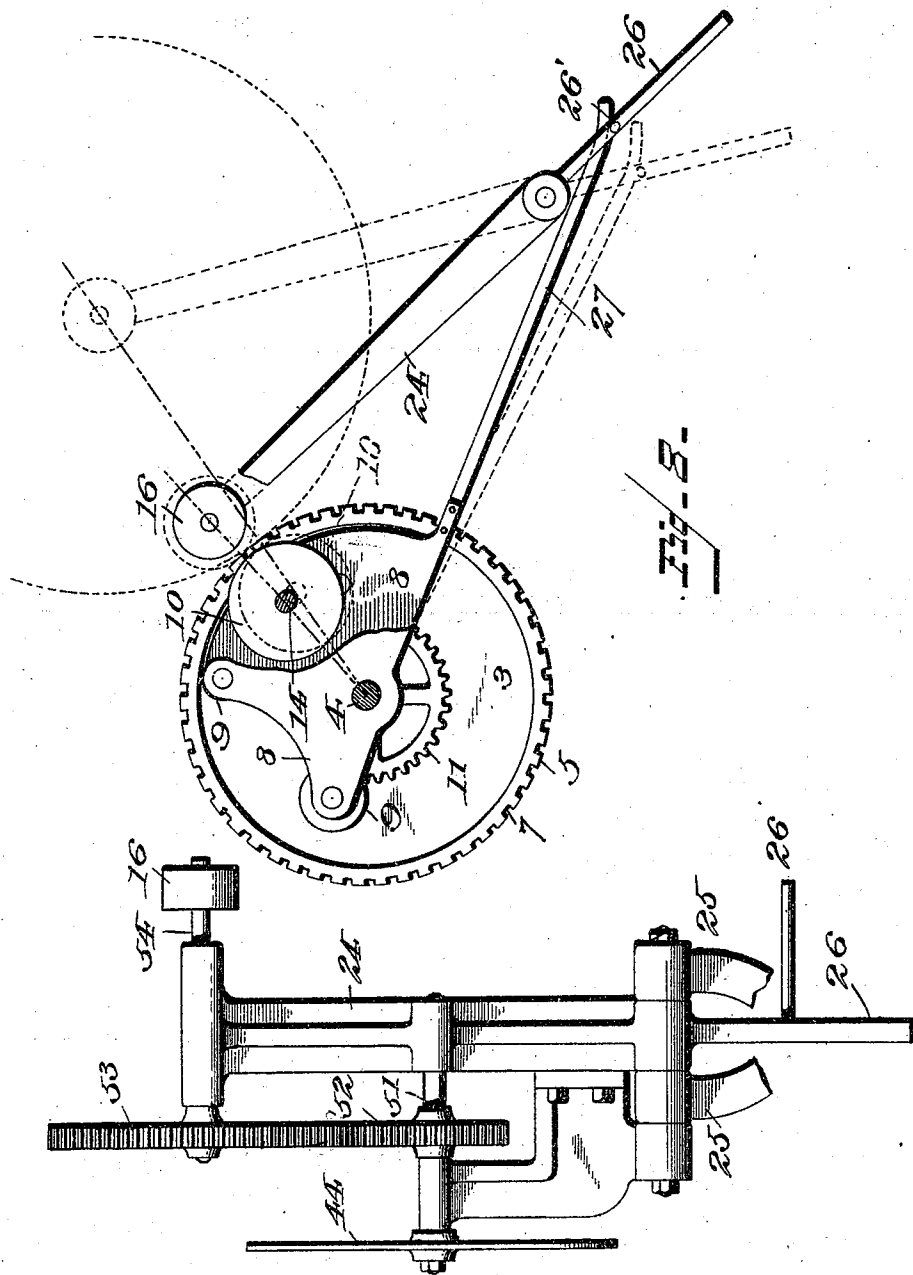
(No Model.)

5 Sheets—Sheet 5.

M. MOUL.
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No. 502,909.

Patented Aug. 8, 1893.



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UNITED STATES PATENT OFFICE.

MARTIN MOUL, OF HANOVER, PENNSYLVANIA.

MACHINE FOR BUNCHING MATCH-STICKS.

SPECIFICATION forming part of Letters Patent No. 502,909, dated August 8, 1893.

Application filed February 25, 1893. Serial No. 463,721. (No model.)

To all whom it may concern:

Be it known that I, MARTIN MOUL, a citizen of the United States, residing at Hanover, in the county of York and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Bunching Match-Sticks; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to certain new and useful improvements in machines for bunching match-sticks.

In a previous invention in the same art, for which Letters Patent were obtained, dated January 10, 1893, No. 489,752, there is shown in connection with other features, a serrated feed-roller in combination with a conveyer-chain for conveying the sticks from the said roller to the bunching-spool. This construction necessitated the employment of two sprocket-wheels for supporting, and a train of gears for operating the said chain, which mechanism it is desired to dispense with in the present application, by feeding the sticks direct from the feed-hopper to the bunching-spool without the use of any intermediate mechanism.

Another object is to provide a more positive feed for the bunching-spool and to cause its speed to diminish in direct proportion to the increase of its diameter, whereby to cause the sticks to be rolled at equal distances apart between the tape and the web.

A further object is to provide a bunching-spool frame having trip-mechanism, and a tension-pulley adapted through intermediate mechanism automatically to be operated by the said trip-mechanism to remove the tension from the drive-belt when the roll of sticks shall have attained the proper diameter.

A further object is to provide a novel form of agitator to co-operate in conjunction with the feed-roller whereby any clogging of the match-sticks within the hopper will be prevented.

A further object is to provide a feed-roller carrying a rocking frame bearing a friction-roller designed to co-act with the bunching-spool to effect the removal of the sticks from

the feed-roller at the proper time to prevent breakage.

A further object is to provide a weighted lever carrying a band-pulley designed to co-act with the tension-belt to keep the latter under the proper tension when the machine is in operation, and to remove tension from the belt when the bunch of sticks is finished.

With these objects in view, the invention consists in the novel construction and combination of parts of a machine for bunching match-sticks, as will be hereinafter fully described and claimed.

In the accompanying drawings forming a part of this specification, and in which numerals of reference indicate corresponding parts: Figure 1, is a side elevation of the machine. Fig. 2, is a plan view. Fig. 3, is a longitudinal vertical sectional view approximately through the center of the machine, showing the internal arrangement of the feed-roller, and also the agitator within the feed-hopper. Fig. 4, is an end elevation. Fig. 5, is a sectional view through the feed-roller. Fig. 6, is an enlarged detail view of the mechanism for throwing the friction-wheels into and out of engagement with the friction-disk, the dotted lines indicating the position when out of operative position. Fig. 7, is a detail in elevation showing the mechanism for driving the bunching-spool. Fig. 8, is a like view, showing the internal mechanism of the feed-roller, and the bunching-spool in contact therewith.

Referring to the drawings, 1 designates the frame of the machine, upon the upper portion of which is mounted a hopper 2. In the lower portion of the hopper and forming the bottom thereof is a feed-roller 3, which is carried by a shaft 4 journaled in suitable bearings on the frame. This feed-roller, which forms one of the important features of this invention, is constructed of two hollow or cap-like sections 5, 6, which are arranged at some distance apart, and each is provided on its periphery with serrations 7 into which the sticks contained within the hopper drop and are carried to the point to be removed by the web, as will appear farther on.

Journaled upon the shaft 4, and housed within the sections 5, 6, is a two-part rocking

frame 8, carrying a series of band-pulleys 9, and a friction feed-roller 10. The latter is revolved by means of a gear-wheel 11, and two pinions 12, 13, the latter of which is rigid with the shaft 14, bearing the said roller. The function of the roller 10 is to feed the web 15 to the bunching-spool 16, while the function of the pulleys 9 is to support a tension-belt 17 in proper relation to the roller, which belt passes from thence around band-pulleys 18 supported by standards 19 on the frame, and then around a tension-pulley 20 to be described farther on. The band-pulleys are revolved by means of gears 21 which mesh with a gear-wheel 22 on the feed-roller shaft, as shown in Fig. 1. As will be seen by reference to Fig. 3 the friction-roller 10 projects through the space between the sections of the feed-roller a sufficient distance to contact with the web 15 at all times during the operation of bunching, by which means the sticks are firmly pressed between the web and the tape 23, and are held against displacement when being dipped.

The swinging frame 24, which supports the bunching-spool, is journaled on a shaft working in bearings 25 projecting from the machine-frame, and carries at its lower end an arm 26 provided with a laterally-projecting pin 26' upon which rests the lower portion of an arm 27 carried by the rocking-frame 8, as clearly shown in Fig. 8, by which arrangement the frame 8 is caused to swing downward as the frame 24 carrying the bunching-spool moves upward and outward in the arc of a circle. The object of this construction is to cause the axes of the feed-roller, bunching-spool, and the friction-roller 10, to occupy the same relation to each other during the operation of bunching a roll of sticks, whereby a uniform pressure and tension is maintained at all times. In other words a straight line connecting the axes of the feed-roller and the bunching-spool would also pass through the axis of the friction feed-roller 10, and by this means the removal of the sticks from the feed-roller is effected at the proper time to prevent breakage.

Journaled below the frame on a shaft 28 is a lever 29 carrying the tension-pulley 20, and at the free end of the lever is suspended a weight 30 which exerts a downward pressure on the said lever and thus causes the pulley to bear upon the tension-belt and keep the same under requisite tension. Depending from the lever 29 is a link 31, which is pivotally attached at its lower end to a second lever 32, which is fulcrumed on the shaft 28 and terminates at its free end with a foot-lever 33. When the bunch of sticks has reached a predetermined diameter it is desirable to wrap the same with two or three folds of the web and tape in order to complete the bunch and to prevent the sticks nearest the end of the roll from dropping out when being handled. In order to accomplish this as rapidly as possible, foot-lever 33 is pressed

down, which removes the pressure of the tension-belt against the web on the friction-roller 10, thus allowing the bunching-spool to be revolved at the full speed of the machine, as no slip will then occur between the friction-wheels 45 and the disk 44. When this occurs it is necessary to stop the feed of sticks which is effected by means of a plate 34 located in the lower end of the hopper, said plate being connected with a hand-lever 35. As this is a common feature in machines of this character, a further description is deemed unnecessary. Rigidly secured on shaft 28 is a toothed-sector 36 which is designed to be engaged by a pawl 37, the end of which projects beyond the frame and is engaged by the lower end of the swinging-frame 24 in its descent, as clearly shown in Fig. 1. The shaft 28 also carries a rigid arm 38 provided at its free end with a band-pulley 39 which is designed to bear against the under side of a drive-belt 40 to cause the latter to exert a sufficient pressure on the drive-pulleys 41, 42, to operate the different parts of the machine. When the frame 24 is moved to the position shown in dotted lines in Fig. 1, the pawl 37 is automatically thrown out of engagement with the sector 36 which allows the arm 38 to drop and thus remove tension from the drive-belt, thereby effecting a stoppage of the machine. When the machine is to be started, a lever 43 secured to the shaft 28 is pressed down, thus raising the pulley 39 into engagement with the drive-belt, as will be understood by reference to Fig. 1.

The friction-disk 44 to which reference has been made, is operated by means of two friction-wheels 45 carried by inclined shafts 46 suitably journaled in the frame. The lower end of each of the shafts carries a bevel-gear 47, which mesh with like gears 48 carried by a drive-shaft 49, the latter receiving motion through the medium of belt 40 from the main drive-shaft 50. Upon the shaft 51 of the friction-disk is mounted a gear-wheel 52 which meshes with a gear-wheel 53 carried by the bunching-spool shaft 54 and imparts motion thereto.

Motion is imparted to the feed-roller by means of a pinion 55, mounted on the shaft 49, which meshes with a gear-wheel 56 carried by a shaft 57, the latter shaft carrying a pinion 58 in mesh with the gear-wheel 22 on the feed-roller shaft. The function of this train of gears is to act as reducing-gears to prevent a too rapid revolution of the feed-roller.

In order to regulate the feed of sticks to the feed-roller, a series of rollers 59 is employed, which are mounted upon a shaft 60 journaled near the discharge-end of the hopper, and receive motion from a sprocket-chain 61, engaging a sprocket-wheel 62 on the shaft 60, the chain being driven from a sprocket-wheel 63 on the shaft 49. The rollers 59 bear upon the periphery of the feed-roller, and rotate in a direction opposite thereto, as indicated by the arrows in Fig. 3, so that there will be no dan-

ger of the sticks becoming clogged at the point where they pass beneath the hopper in their passage to the bunching-spool. Immediately back of the rollers, and secured within the hopper, is a series of curved resilient fingers or plates 64 which co-act with the rollers 59 in preventing any clogging of the sticks.

The agitating mechanism, to which reference has been made, is located at the rear side of the hopper, and consists of two connected bell-crank-levers 65 having a rigid connection with a rock-shaft 66 journaled in bearings projecting from the machine-frame. To the lower end of each of the said levers is pivotally connected one end of a link 67, the other end of which is pivotally connected with a plate 68, pivoted at its upper end in the frame. On the shaft 66 is rigidly secured a lever 69, the lower end of which connects through the medium of a pitman-rod 70 with a small wheel 71 which receives motion from the sprocket-chain 61 passing around the sprocket-wheel 72. The pitman-rod is eccentrically connected to the wheel 71 in order to receive a reciprocatory motion from its rotation and thus oscillate the shaft 66 which through the medium of the bell-crank levers and the links 67 imparts a "kicking" motion to the plate 68 which forms the rear lower wall of the hopper. The plate 73 carried by the bell-crank levers is provided with a flange or toe 74 which bears upon the plate 68 and thus has two distinct motions imparted to it, namely: the kicking motion derived from the plate 68, and a reciprocating motion derived from the bell-crank levers. In order to increase the efficiency of the agitating mechanism, the rear wall of the hopper is formed of a sheet of resilient material, preferably of metal, and is provided at its lower end with a toe or flange 75, which bears against the plate 73. By the combined actions of the plates 68, 73, and the rear wall of the hopper, the sticks are thoroughly and continuously agitated so long as the machine is in operation. In order to regulate the agitating mechanism, both the bell-crank-levers, and the lever 69 are provided with a plurality of openings 76 so as to permit of a number of adjustments of both the pitman-rod and the links, whereby to increase or diminish the thrust of the parts as may be desired.

In order to throw the friction-wheels out of contact with the friction-disk, the mechanism shown in Fig. 6 is employed, and consists of an arm 77 which projects through a slot in an upright 78 and is pivoted to a lever 79, the upper end of said lever being controlled by a cam-lever 80 secured to the upper end of the upright 78. By operating the cam-lever, the friction-wheel may be moved into or out of contact with the friction-disk.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a machine for bunching match-sticks, a hopper, a two-part feed-roller, a rocking

frame journaled within the feed-roller and bearing a friction-surface, and a swinging frame carrying a bunching-spool adapted to contact with the said surface.

2. In a machine for bunching match-sticks, a hopper, a two-part feed-roller, a rocking frame journaled on the feed-roller bearing and carrying a friction-roller, and a swinging frame carrying a bunching-spool coacting with the friction-roller.

3. In a machine for bunching match-sticks, a hopper, a serrated feed-roller mounted below the same, a friction-roller within the feed-roller, and a bunching-spool adapted to co-act with the said friction-roller.

4. In a machine for bunching match-sticks, a hopper, a serrated feed-roller mounted below the same, a friction-roller within the feed-roller, a friction-belt co-acting with the friction-roller, and a bunching-spool adapted to co-act with the latter roller.

5. In a machine for bunching match-sticks, a hopper, a serrated feed-roller mounted below the same, a positively-actuated friction-roller within the feed-roller, a friction-belt co-acting with the friction-roller, and a bunching-spool co-acting with the latter roller.

6. In a machine for bunching match-sticks, a hopper, a serrated feed-roller mounted below the same, a positively-actuated friction-roller within the feed-roller, a frictionally-driven belt co-acting with the friction-roller, and a bunching-spool adapted to co-act with the latter roller.

7. In a machine for bunching match-sticks, a hopper, a feed-roller mounted below the same, a rocking-frame journaled within the said roller and carrying a friction-roller, a swinging frame carrying a bunching-spool adapted to co-act with the latter roller, and a tension-belt co-acting with the friction-roller.

8. In a machine for bunching match-sticks, the combination with a hopper and a serrated feed-roller journaled below the same, of a swinging frame carrying a bunching-spool, a rocking-frame journaled within the feed-roller and carrying a friction-roller and mechanism for imparting motion thereto, and a tension-belt in contact with the friction-roller.

9. In a machine for bunching match-sticks, the combination with a feed-roller and a drive-belt adapted through intermediate mechanism to impart motion thereto, of a swinging frame carrying a bunching-spool, a rocking-frame journaled within the feed-roller and carrying a friction-roller adapted to co-act with the bunching-spool, a projection on the swinging frame with which the rocking-frame contacts, a shaft carrying an arm bearing a band-pulley adapted to bear against the drive-belt, a toothed-sector carried by the shaft, and a pawl designed to engage the said sector to hold the band-pulley in engagement with the said belt, the free end of the pawl being arranged in the path of movement of the swinging frame, whereby the latter is caused to contact with the pawl to throw it out of contact

with the sector, thus allowing the band-pulley to drop and remove the tension from the drive-belt.

10. In a machine for bunching match-sticks, 5
a two-part feed-roller, a frame housed within the roller and carrying a positively-actuated friction-roller, and a bunching-spool co-acting directly with the friction-roller.

11. In a machine for bunching match-sticks, 10
a two-part feed-roller, a frame housed within the roller and carrying a positively-actuated friction-roller, and a positively-actuated frictionally-controlled bunching-spool co-acting directly with the friction-roller.

12. In a machine for bunching match-sticks, 15
a two-part feed-roller, a frame housed within the roller and carrying a positively-actuated friction-roller, a friction-belt in contact with the friction-roller and a bunching-spool co-acting directly with the latter roller. 20

13. In a machine for bunching match-sticks, 25
a two-part feed-roller, a frame housed within the roller and carrying a friction-roller, and a bunching-spool co-acting with the friction-roller.

14. In a machine for bunching match-sticks, a two-part feed-roller, a rocking-frame within the roller, a friction-roller carried by the frame, and a bunching-spool.

15. In a machine for bunching match-sticks, 30
a two part feed-roller, a rocking frame within the roller, a friction-roller carried by the frame, and a swinging frame carrying a bunching-spool coacting with the friction-roller. 35

16. In a machine for bunching match-sticks, 35
the combination with a hopper having a resilient rear wall, of a series of agitators, and mechanism for imparting a rectilinear vibratory motion to one of the agitators in the direction of the bottom of the hopper, and a vibratory motion to the other agitator and to the rear wall. 40

In testimony whereof I affix my signature in presence of two witnesses.

MARTIN MOUL.

Witnesses:

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