

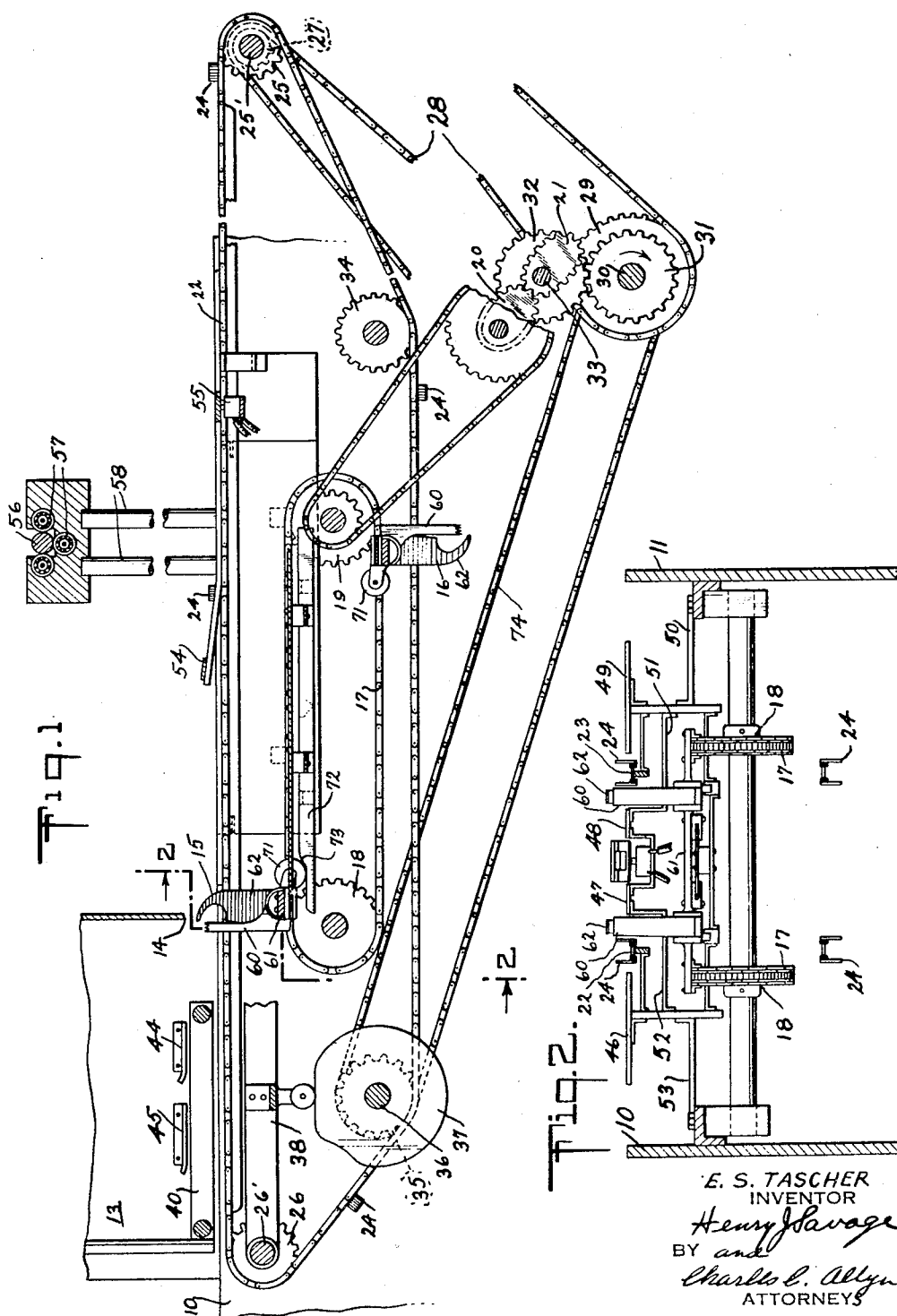
July 3, 1951

E. S. TASCHER
SHEET FEEDING MECHANISM

2,559,235

Filed April 14, 1947

3 Sheets-Sheet 1



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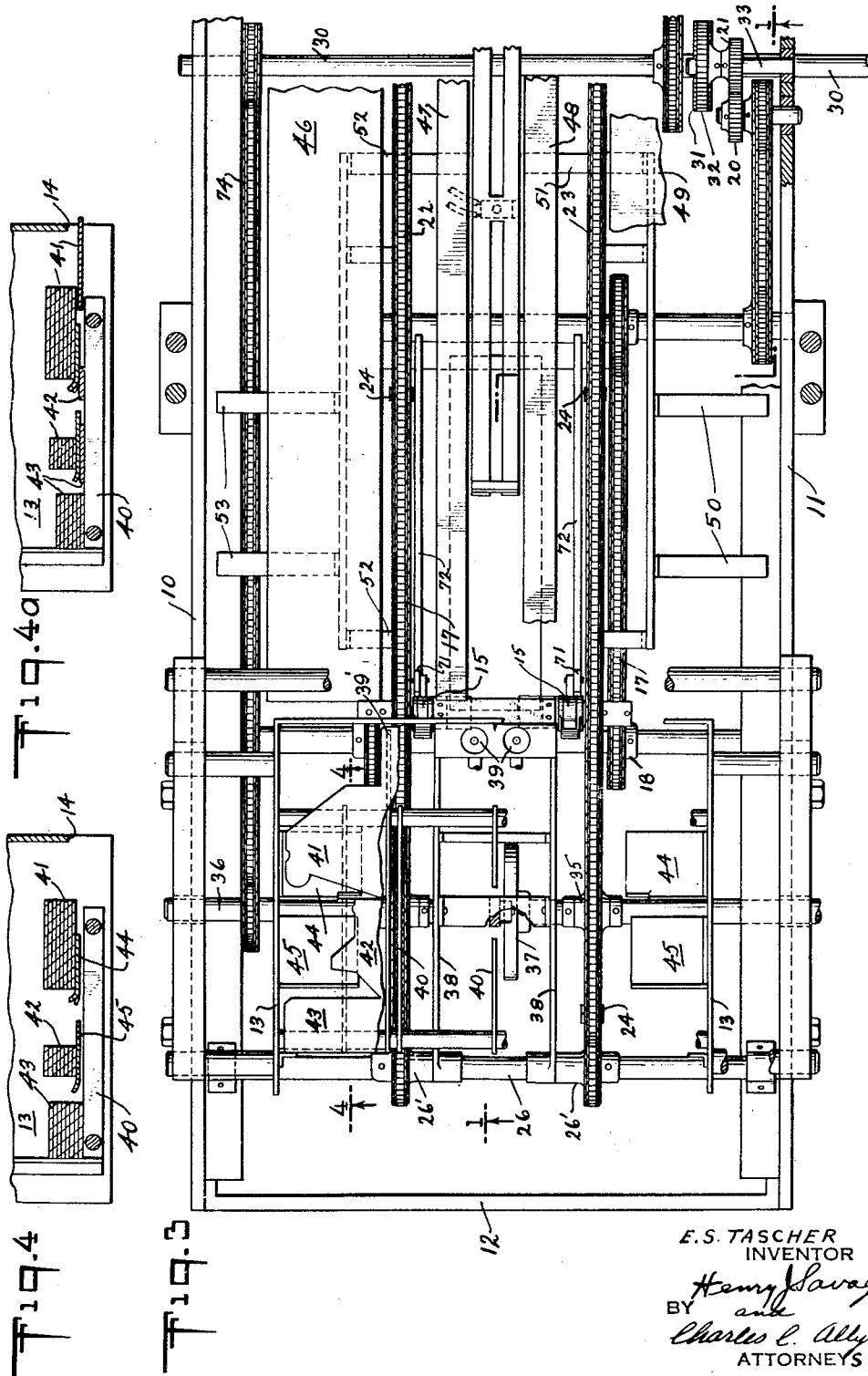
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Fig. 5

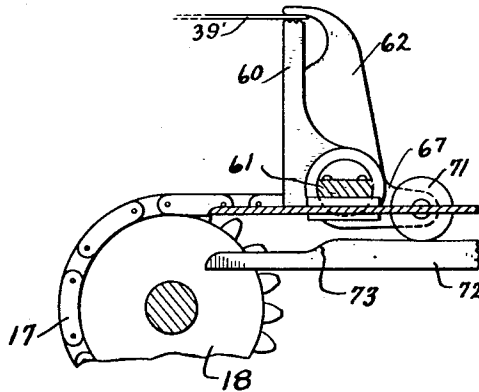


Fig. 6

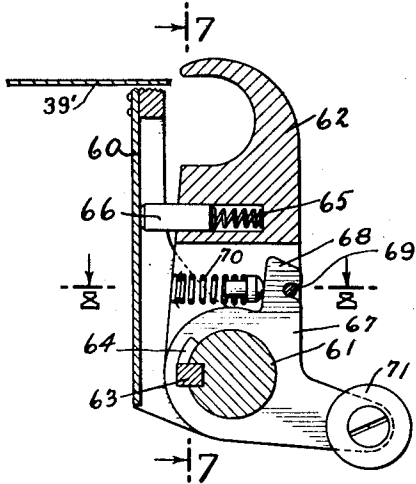


Fig. 7

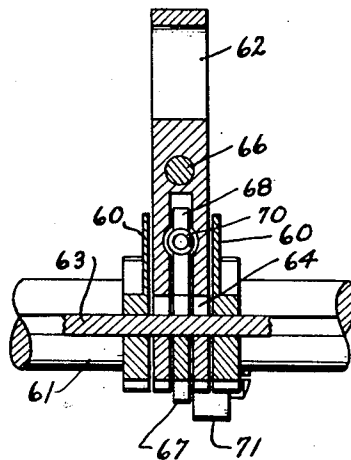
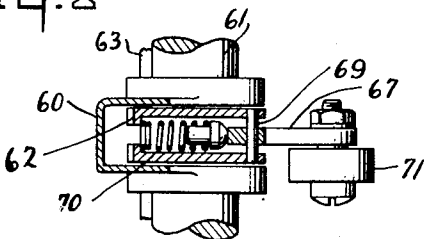


Fig. 8



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UNITED STATES PATENT OFFICE

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SHEET FEEDING MECHANISM

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9 Claims. (Cl. 271-6)

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My invention relates to sheet feeding mechanism and particularly to mechanism for feeding carton blanks from a stack to a carton former.

An important object of my invention is to increase both the speed and the accuracy with which carton blanks can be fed to a former.

Heretofore carton blanks have been fed, one at a time, from the bottom of a vertical stack by a reciprocating head having grippers that grip the bottom blank at one end of its stroke, pull it from the stack and deliver it to the former at the other end of its stroke. Such feeders have several defects or objections among which are their limitations as to speed and the fact that the grippers often vary in tension or in the force with which they grip the two sides of each blank, so that sometimes a blank is biased in the machine. When this occurs, the blank will not be properly aligned in the former and will be destroyed. The heavy reciprocating head limits the speed of operation by setting up prohibitive vibrations at high speeds.

Among the objects of my invention therefore are to produce a carton feeder that has no reciprocating head and in which the grippers always grip the blank with a uniform squeeze, thereby assuring rapid and accurate feeding of the blanks.

Another object is to relieve the wings and flaps of the bottom carton blank from pressure of blanks above it, when it is being pulled from the stack.

Another object is to provide means whereby the grippers in a carton feeding machine will be driven continuously in an endless path, but at a variable speed, and will be moving at their minimum speed at the instant they grip a carton blank, thereby starting the blank from the stack with a gentle pull.

Another object is to provide novel grippers that will always grip the blanks with substantially uniform pressure, even though a single blank may vary in thickness at its two ends, as well as where successive blanks vary in thickness.

Still another object is to provide grippers and operating mechanism therefor that will automatically compensate for wear of the parts and always exert a uniform grip without adjustment of the parts.

Another advantage of my invention is that it will feed carton blanks of a given size from a stack of blanks to a carton former at least twice as fast as has been practicable heretofore with reciprocating feeders.

The above and other objects and advantages are attained by my invention, one embodiment

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of which I have illustrated in the accompanying drawings wherein:

Fig. 1 is a longitudinal section taken substantially on the line 1-1 of Fig. 3.

Fig. 2 is a cross section taken substantially on the line 2-2 of Fig. 1.

Fig. 3 is a top plan view with some parts in section and others broken away to more clearly show other parts.

Fig. 4 is a section of the carton hopper taken substantially on the line 4-4 of Fig. 3.

Fig. 4a is a view similar to Fig. 4 but showing the lowest blank partly withdrawn.

Figs. 5, 6, 7 and 8 are detail views of one of the grippers, Figs. 7 and 8 being taken on the lines 7-7 and 8-8 respectively of Fig. 6.

Referring to Figs. 1, 2 and 3, the embodiment of my invention that I have illustrated has a frame formed from side members 10, 11 connected at each end by cross bars 12, only one of which is shown.

At the rear end of the frame, there is a hopper 13 adapted to hold a vertical stack of carton blanks or other sheets which are withdrawn, one at a time, through a slot 14 in the front of the hopper by pairs of grippers 15, 16, each pair being fixed to a bar fastened to parallel endless chains 17 which pass around sprockets 18, 19 and are driven continuously but at varying speeds through elliptical gears 20, 21.

The pairs of grippers 15, 16 deliver the carton blanks successively to a pair of parallel carrier chains 22, 23, each of which has a number of spaced pushers 24 that position the carton blanks on the chains as they are carried to the forming machine.

The carrier chain 22 passes around front and rear sprockets 25, 26. The sprocket 25 is secured to a shaft 25' having a sprocket 27 that is driven by a chain 28 from a sprocket 29 on the main drive shaft 30, and sprocket 26 is fixed to a shaft 26' at the opposite end of the machine.

The shaft 30 has a gear 31 meshing with a gear 32 keyed to a stub shaft 33 on which the elliptical gear 21 is fixed.

The chain 22 passes over idlers 34 and 35, the latter rotating on a shaft 36 carrying a cam 37 which raises and lowers the arms 38 fixed to the suction cups 39 which are raised and lowered in timed relation with the movement of the grippers 15, 16 to pull down the front edge of the bottom blank or sheet in the hopper so that it can be seized by the grippers. This operation of the suction cups is usual in this art and the mechanism is not illustrated in detail. The chain 23, sim-

ilarly to the chain 22, passes over sprockets on the shafts 25' and 26' and over idlers on the same shafts as idlers 34, 35. These idlers are not shown in the drawings because of the plane on which Fig. 1 is taken, but the chains 22 and 23 are similar and parallel throughout their lengths.

The carton blanks 39' in the hopper 13 are supported on bottom bars 40 and usually have end closing flaps and tongues 41, 42, 43 projecting from each side, as best shown in Fig. 3. These flaps and tongues are attached to the carton body along score lines where they are folded in forming the box and this weakens the material so that the projecting flaps and tongues may be torn off if they catch while being withdrawn.

In order to protect the tongues and flaps from injury, I provide pressure release guides 44, 45 on each side of the hopper which have curved entrant ends so that as a blank is withdrawn, the flaps and tongues will pass under these guides and be relieved from pressure of the stack of blanks, as best shown in Figs. 4 and 4a. The pairs of grippers 15, 16 are driven continuously but at a variable speed and the elliptical gears are so arranged that the grippers will be travelling at their minimum speed when in the positions shown in Fig. 1. The ratio of the gearing is such that the grippers will travel from the position shown at 15 to the position shown at 16 at each revolution of the elliptical gears 20, 21.

The grippers 15 in Fig. 1 are in position to grip the bottom carton from the stack which is pulled down by the suction cups 39 at this time. The gripper closes on the front edge of the carton at this point and since it is moving forward at its slowest speed, it will gently pull the bottom blank from the stack and the projecting flaps 42, 43 will pass under the pressure release guides 44, 45. As the grippers travel from the rear of the machine toward the front, or from left to right in Fig. 1, they pull the blank out over the carrier chains 22, 23 and drop the blank on the longitudinal supporting bars 46, 47, 48 and 49, Figs. 2 and 3, which are supported on the frame members 10, 11 by brackets and arms 50, 51, 52 and 53 as best shown in Fig. 2. As the grippers approach the sprockets 19, they release the carton blank which is left resting on the supporting bars 46-49 just in front of one pair of the pushers 24 fixed to the carrier chains 22, 23. As the carton blank is advanced by the grippers, its front edge passes under the liner control switch 54 which actuates a control switch 55 that controls the feed of the liner to the carton blank. This is a common control means and is not shown in detail since per se it is not part of the present invention. When the control switch 54 is lifted by a carton blank passing under it, the switch 55 is closed and a carton liner is fed on top of the blank from a roll of lining paper which is carried by a shaft 56 supported in roller bearings 57 on standards 58 above the frame of the machine.

The chains 22, 23 are driven at a higher speed than the gripper chains 17 and the pushers 24 are located on the carrier chains so that a pusher or pair of pushers will be just behind the rear edge of the carton blank when it is released by the grippers.

The grippers form an important part of my invention and are best shown in Figs. 5 to 8.

Each gripper has an anvil 60 which is connected to a bar or shaft 61 the opposite ends of which are fixed to the two gripper chains 17. Each gripper has a movable jaw 62 that has a limited

oscillatory movement on the shaft 61. The movement of the jaw is limited by a key 63 which extends into an arcuate recess 64 formed in the jaw. This key 63 may serve to fix the anvil 60 with respect to the shaft. A coil spring 65 housed in a recess in the jaw 62 presses against a plunger 66 and normally holds the jaw open as shown in Fig. 6.

The jaw 62 is actuated by an arm 67 mounted so as to have a limited movement with respect to the shaft 61. This arm has an upstanding lug 68 which is normally held in engagement with a stop pin 69 on the jaw 62 by a spring 70 which is relatively stiff as compared with the spring 65. The arm 67 carries a roller 71 which travels in a path so that it will strike a cam 72 when the gripper is travelling on the upper run of the chain 17. As shown in Fig. 1 the cam 72 extends substantially from the sprocket 18 to the sprocket 19 and has a rise 73, Fig. 5, which begins near the sprocket 18 and extends to the opposite end of the cam.

The cam 37 is driven in properly timed relation from a sprocket on the shaft 30 through a chain 74 that drives a sprocket keyed to shaft 36. The cam 37 is timed so that it will have actuated the suction cups 39 to pull down the front edge of a carton blank or sheet as each pair of grippers rises to the top of the sprocket 18, as shown in Fig. 1.

When the grippers rise around the sprockets 18 and reach the position shown in Figs. 1 and 6, they are moving at their slowest speed and the rollers 71 are just coming into engagement with the rise 73 on the cams 72. The lower carton blank 39' has been pulled down by the suction cups 39 and released in engagement with the anvils 60. On continued movement of the grippers 15 the rollers 71 ride up on the rise 73 of the cams which close the jaws against the anvils to grip the blank as shown in Fig. 5. The spring 65 is lighter than the spring 70 so that the actuating arm 67 and jaw 62 move as a unit or integral piece when the roller 71 is raised by the cam until the jaw closes on the carton blank. Usually the cams 72 are adjusted so that the roller 71 is raised slightly after the jaw 62 is closed. This slightly compresses the safety spring 70 and also assures a tight grip on the carton blank regardless of variations in thickness. This over-travel of the actuating arm 67 also compensates for any wear on the parts so that frequent adjustments of the cams 69 are not necessary.

While I have illustrated my invention with two grippers in each set, the invention is not limited thereto. In the case of very wide sheets or blanks, more than two grippers may be employed and when narrow strips are to be fed, a single gripper may be sufficient.

Having thus described what I now believe to be the best form of my invention, I claim all equivalents and modifications thereof that may come within the terms or spirit of my claims.

I claim:

1. In a sheet feeding mechanism, the combination of a frame, a hopper at one end of the frame adapted to hold a vertical stack of blanks and having an opening at the bottom of its front side through which the bottom sheet may be withdrawn from the stack, an endless chain having horizontal upper and lower runs with the upper run extending forward away from said hopper and its rear end beneath and adjacent the opening in said hopper, a gripper attached to said chain and adapted as the chain passes from

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its lower to its upper run to come adjacent the forward edge of the bottom blank in the stack, means for pulling down the forward edge of the bottom blank against the gripper, means for holding the gripper open as it rises to the upper run of the chain, means for closing the gripper on the forward edge of the bottom blank, and means for driving the chain and gripper continuously and at a cyclically variable speed with the lowest speed of said cycle occurring periodically at the time the gripper closes on the blank.

2. In a machine for feeding carton blanks that have end closing flaps and tongues projecting beyond the body of the blank, the combination of a frame having a hopper at one end adapted to hold a vertical stack of blanks, the bottom of the hopper having longitudinal bars for supporting the stack of blanks, pressure release guides on each side of the hopper spaced above the supporting bars so that the tongues and flaps of the bottom blank may pass between the guides supporting the tongues and flaps of the blanks above the bottom blank, whereby the tongues and flaps of the bottom blank are relieved from pressure of the blanks above, a gripper driven continuously in an endless path having upper and lower runs, means for holding the gripper open at one end of its upper run preparatory to its gripping the forward edge of the bottom blank, means for pulling down the forward edge of the bottom blank to open the gripper, means for closing the gripper on the bottom blank, and means for driving the gripper continuously and at cyclically variable speeds with the speed of the gripper being least when it grips the blank.

3. In a sheet feeding device for feeding from a stack of sheets supported therein, the combination of a frame, an endless chain mounted therein having upper and lower runs, movable suction cups mounted to engage the undersurface of the lowermost sheet in said stack to flex said sheet downwardly therefrom, a gripping element carried by said chain comprising an anvil fixed with respect to the chain and a movable jaw pivotally supported with respect to the anvil for operating said gripping element to positively grip the leading edge of said flexed sheet, yieldable means normally holding the jaw open away from the anvil, a cam bar extending parallel to the upper run of the chain and having a rise adjacent one end thereof, an actuating arm connected to said movable jaw, said arm carrying a roller in alignment with said cam bar and adapted to be rocked against the action of said yieldable means to close said jaw when the roller strikes the rise on said cam and hold it closed as the roller continues to ride on the bar, and means for driving said endless chain and gripper continuously.

4. In a sheet feeding device, the combination of a frame, an endless chain mounted therein having upper and lower runs, a gripper carried by said chain having an anvil fixed with respect thereto, a movable jaw pivotally supported with respect to the anvil, yieldable means normally holding the jaw open away from the anvil, a cam bar extending parallel to the upper run of the chain and having a rise adjacent one end thereof, an actuating arm connected to said movable jaw and having a roller in alignment with said cam bar adapted to close said jaw when the roller strikes the rise on said cam and hold it closed as the roller continues to ride on the bar, and means for driving said endless chain

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and gripper continuously and at cyclically variable speeds with the lowest speed of said cycle occurring periodically at the time the jaw is closed by the roller's striking the rise on the cam bar.

5. In a sheet feeding mechanism, the combination of a frame, an endless chain mounted thereon having upper and lower runs, a gripper carried by said chain having an anvil fixed with respect thereto, a movable jaw pivotally supported with respect to the anvil, an opening spring between the jaw and anvil normally holding the jaw open, a cam bar extending parallel to the upper run of the chain and having a rise adjacent one end thereof, an actuating arm for closing said jaw having a roller in alignment with said cam bar and adapted to ride thereon when the gripper is travelling with the upper run of the chain, a compensating spring between the actuating arm and jaw stronger than said opening spring and opposed thereto, said compensating spring holding said actuating arm against a stop on the jaw so that the arm and jaw normally move as a unit member, said compensating spring yielding when the jaw is firmly closed upon further movement of the arm by the cam bar, and means for driving said endless chain and gripper continuously.

6. In a sheet feeding mechanism, the combination of a frame, an endless chain mounted thereon having upper and lower runs, a gripper carried by said chain having an anvil fixed with respect thereto, a movable jaw pivotally supported with respect to the anvil, an opening spring between the jaw and anvil normally holding the jaw open, a cam bar extending parallel to the upper run of the chain and having a rise adjacent one end thereof, an actuating arm for closing said jaw having a roller in alignment with said cam bar and adapted to ride thereon when the gripper is travelling with the upper run of the chain, a compensating spring between the actuating arm and jaw stronger than said opening spring and opposed thereto, said compensating spring holding said actuating arm against a stop on the jaw so that the arm and jaw normally move as a unit member, said compensating spring yielding when the jaw is firmly closed upon further movement of the arm by the cam bar, and means for driving said endless chain and gripper continuously and at cyclically variable speeds with the lowest speed of said cycle occurring periodically when the jaw is closed by the roller's striking the rise on the cam bar.

7. In a sheet feeding mechanism, the combination of a frame, parallel front and rear shafts rotatably mounted therein, a pair of sprockets secured to each shaft, parallel endless chains having upper and lower runs passing around sprockets on the two shafts, a gripper bar secured at each end to one of said chains, two grippers carried by said bar, one adjacent each chain, each gripper having an anvil fixed to the bar, a jaw movably mounted on said bar and adapted to close on said gripper to hold a sheet, yieldable means normally acting to hold the jaw away from the anvil, an actuating arm movably mounted on said bar and yieldably connected to the jaw to close it against the anvil, a cam bar parallel to and adjacent the upper run of each chain, each cam bar having a rise adjacent the start of the upper run and extending substantially to the other end thereof, each actuating arm having a roller adapted to engage the rise

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on one of said cam bars and hold its associated jaw closed against the anvil during its travel with the upper run of the chains, and means for driving said shafts, sprockets, chains and grippers continuously.

8. In a sheet feeding mechanism, the combination of a frame, parallel front and rear shafts rotatably mounted therein, a pair of sprockets secured to each shaft, parallel endless chains having upper and lower runs passing around sprockets on the two shafts, a gripper bar secured at each end to one of said chains, two grippers carried by said bar, one adjacent each chain, each gripper having an anvil fixed to the bar, a jaw movably mounted on said bar and adapted to close on said gripper to hold a sheet, yieldable means normally acting to hold the jaw away from the anvil, an actuating arm movably mounted on said bar and yieldably connected to the jaw to close it against the anvil, a cam bar parallel to and adjacent the upper run of each chain, each cam bar having a rise adjacent the start of the upper run and extending substantially to the other end thereof, each actuating arm having a roller adapted to engage the rise on one of said cam bars and hold its associated jaw closed against the anvil during its travel with the upper run of the chains, and means for driving said shafts, sprockets, chains and grippers continuously and at cyclically variable

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speeds with the lowest speed of said cycle occurring periodically when the jaws are closed by the rollers' striking the rises on the cam bars.

9. In a sheet feeding mechanism, the combination of means for holding a vertical stack of sheets, and endless carrier having upper and lower runs, driving means for driving said carrier continuously and at cyclically varying speeds, a set of grippers on said carrier, said grippers on the upper run of the carrier passing under said stack of sheets, means for causing said grippers to grip the leading edge of the bottom sheet, said driving means being operative periodically to move the carrier and grippers at their slowest speed at the time the grippers grip the sheet.

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