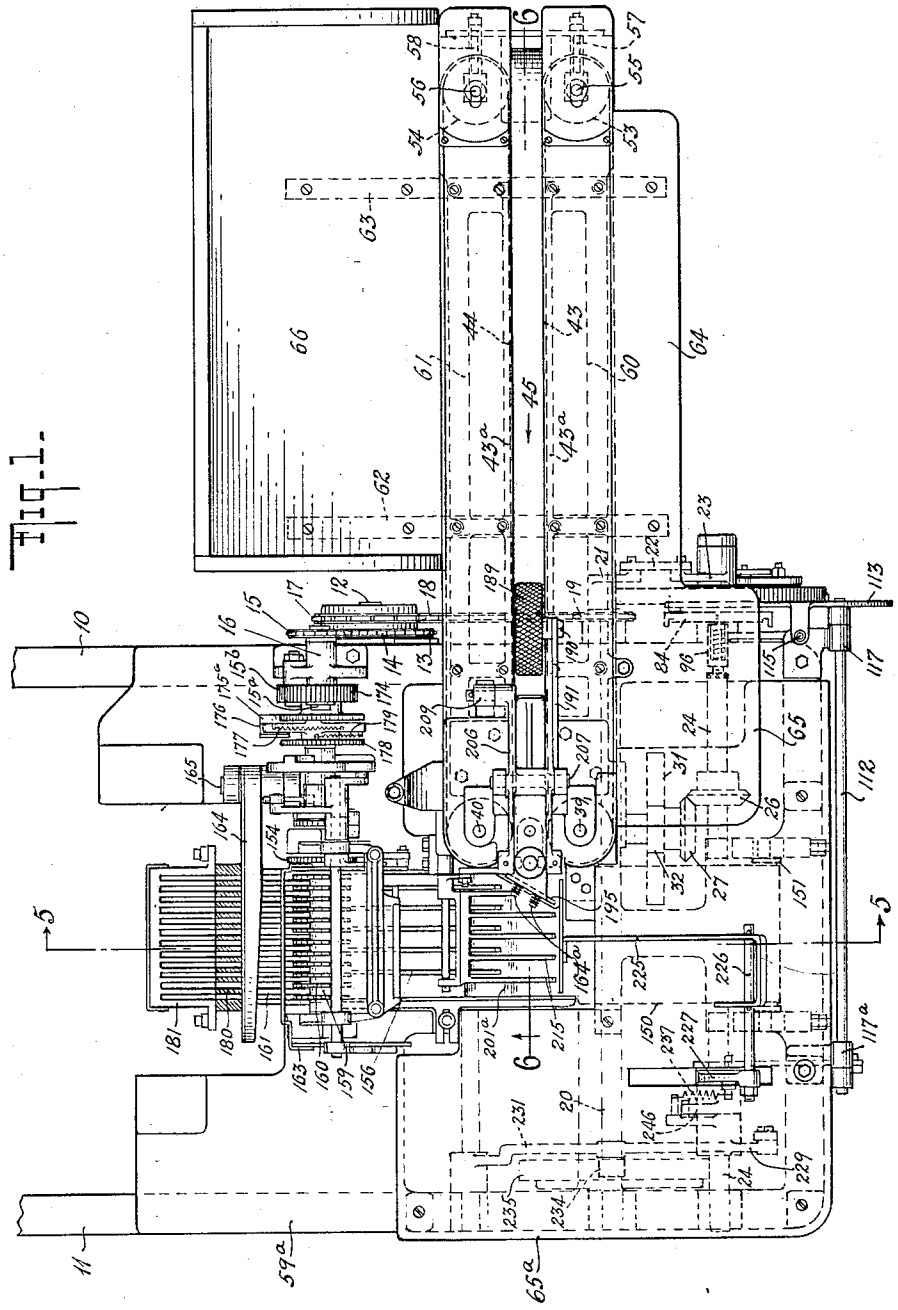
Dec. 29, 1931. W. H. SCHUSSLER 1,838,115

CROSS FEED MECHANISM

Filed Nov. 28, 1930 6 Sheets-Sheet 1

Fig. 1.



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CROSS FEED MECHANISM

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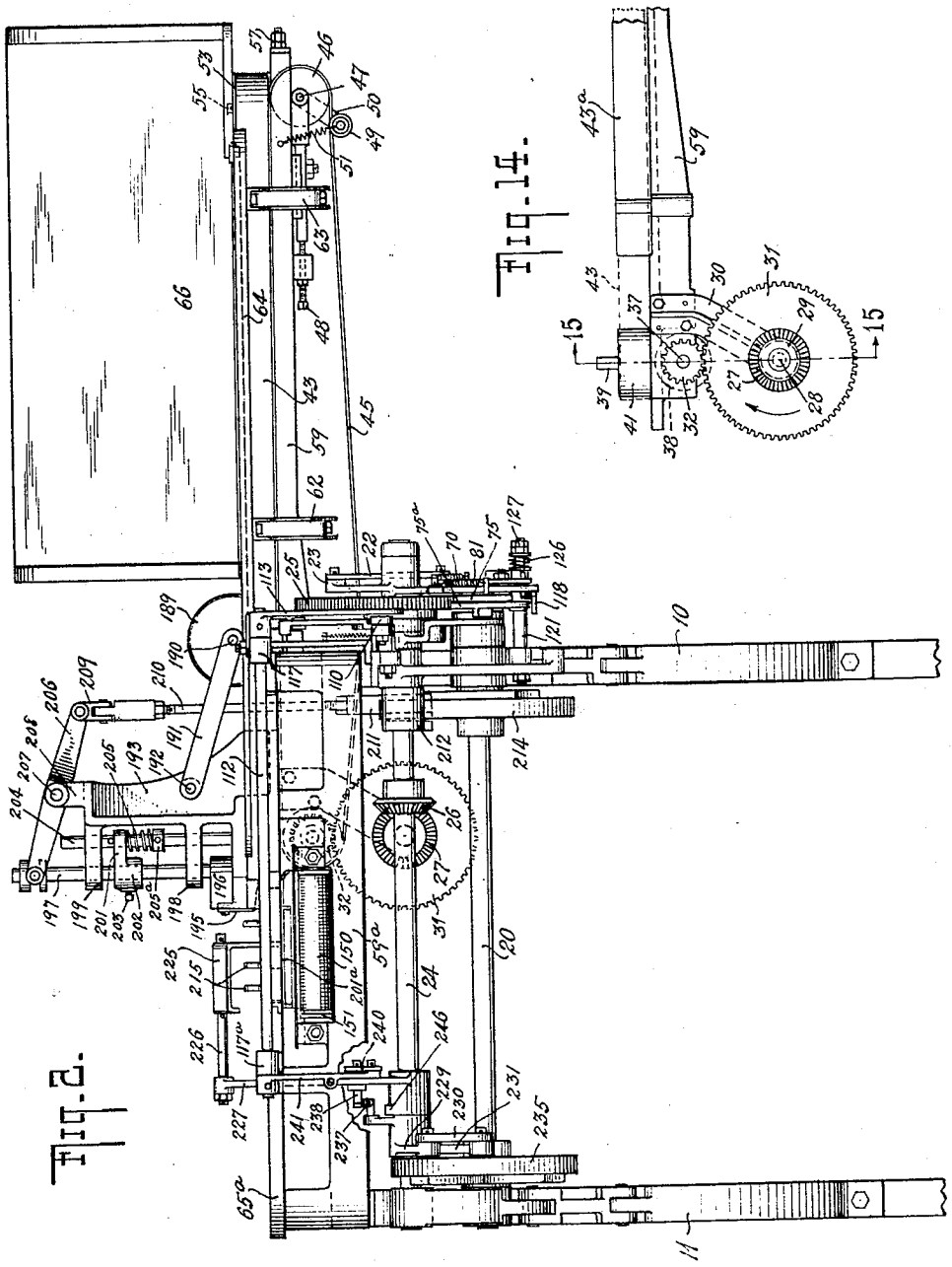


Fig. 13.

Fig. 14.

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CROSS FEED MECHANISM

Filed Nov. 28, 1930 6 Sheets-Sheet 3

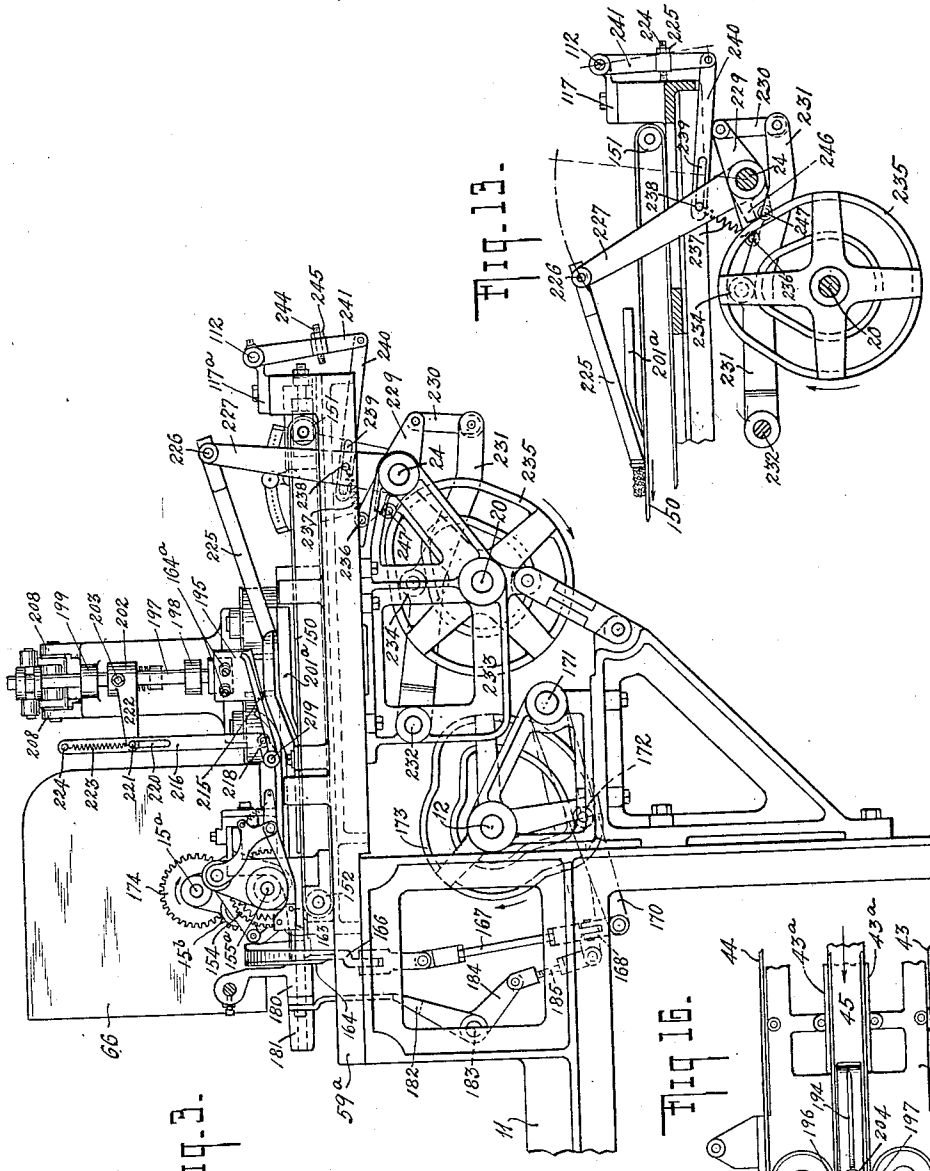


Fig. 3.

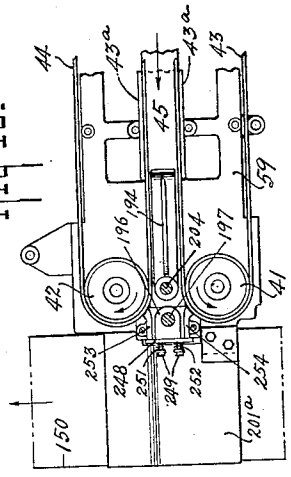


Fig. 16.

Fig. 15.

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CROSS FEED MECHANISM

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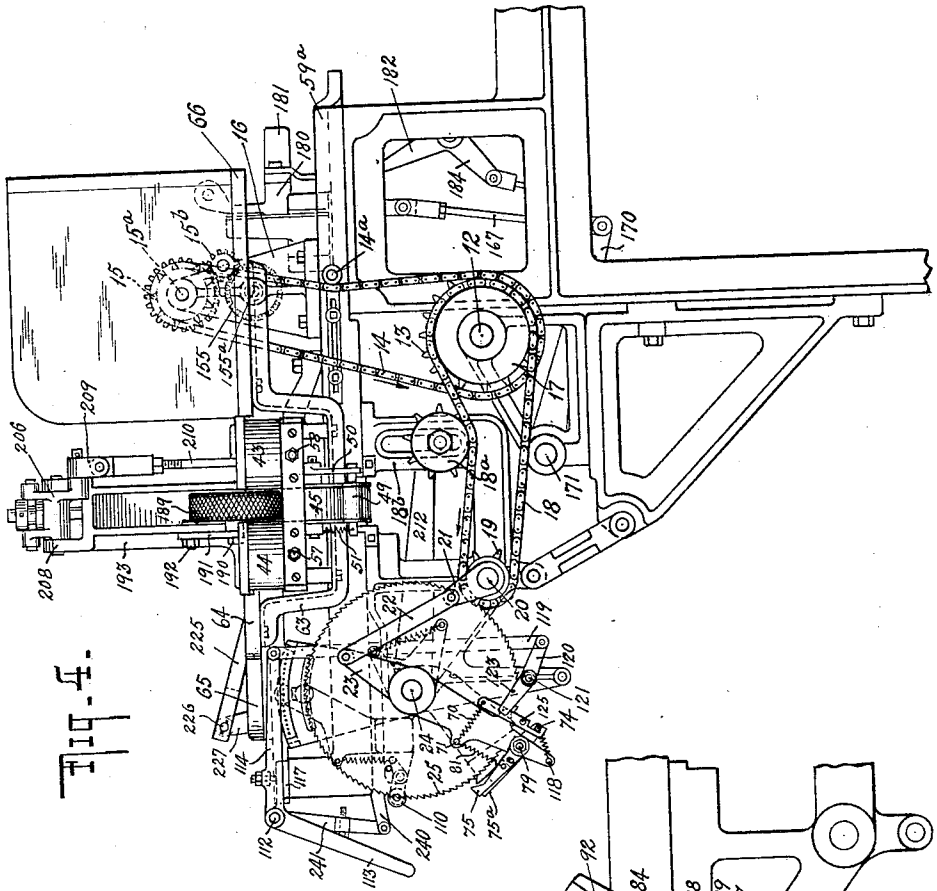


Fig. 4.

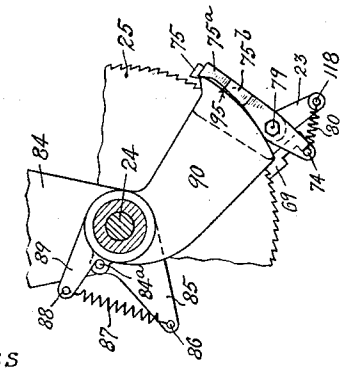


Fig. 11.

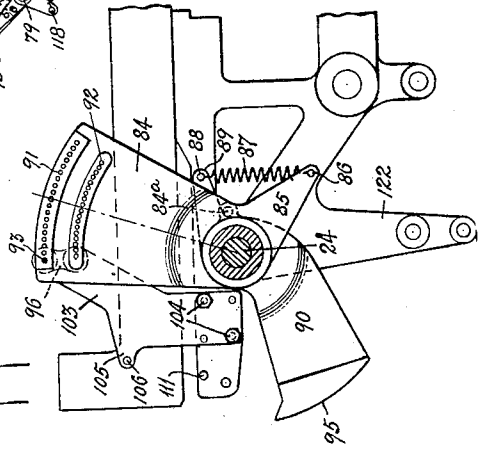


Fig. 12.

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CROSS FEED MECHANISM

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Fig. 5.

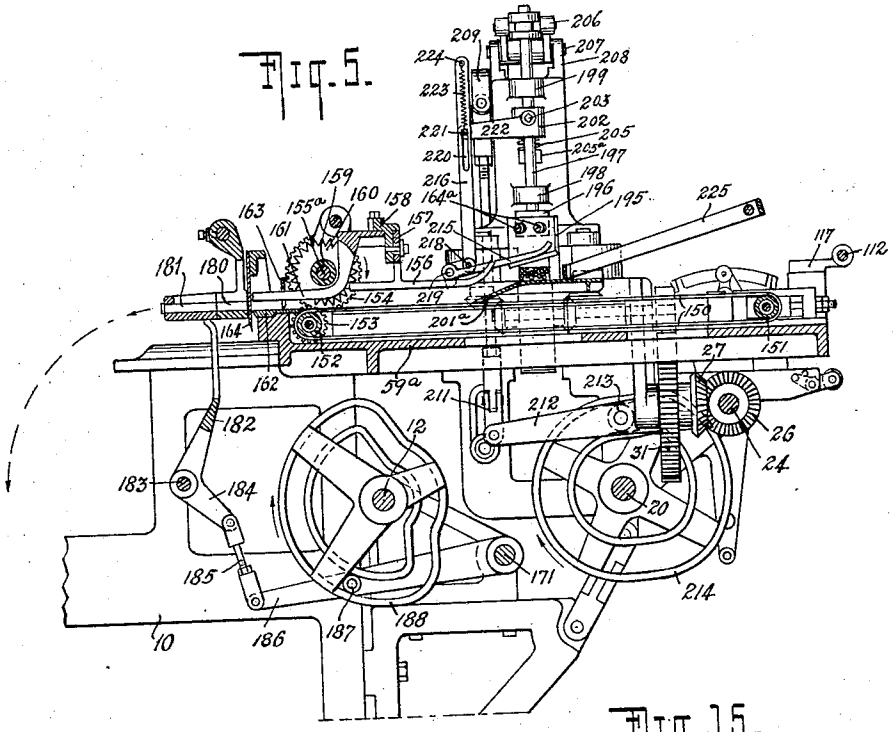


Fig. 15.

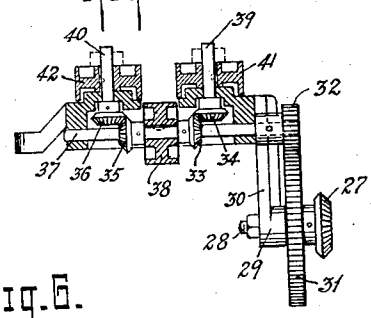
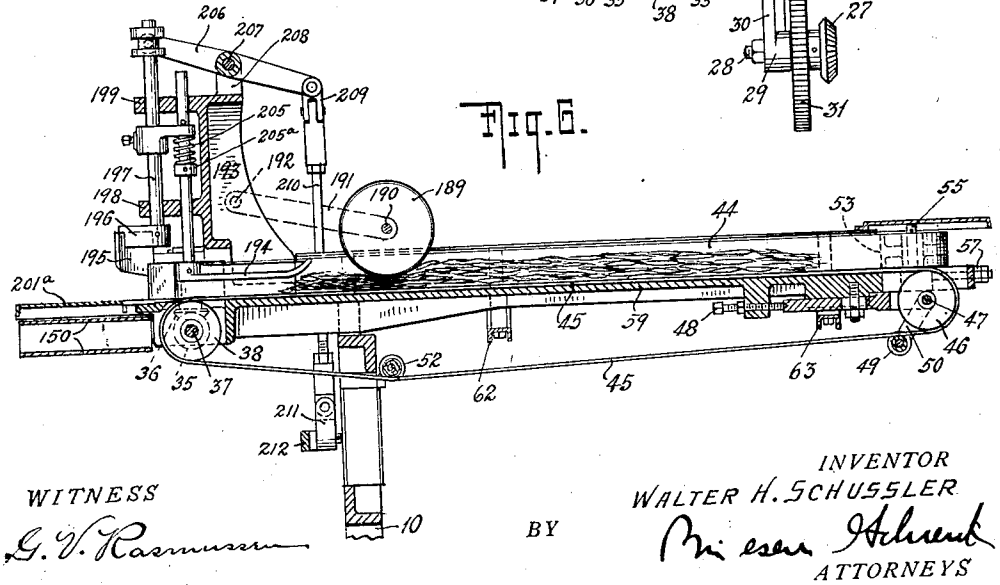


Fig. 6.



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CROSS FEED MECHANISM

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Fig. 6.

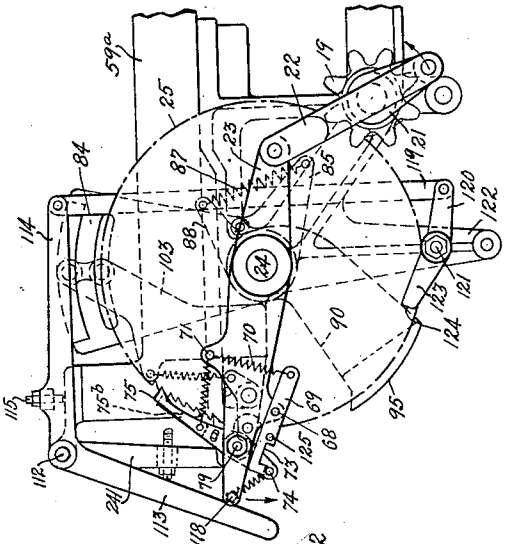


Fig. 8.

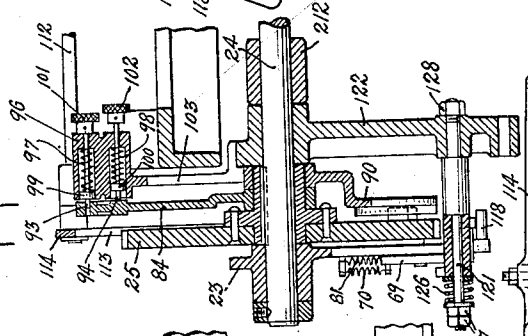


Fig. 10.

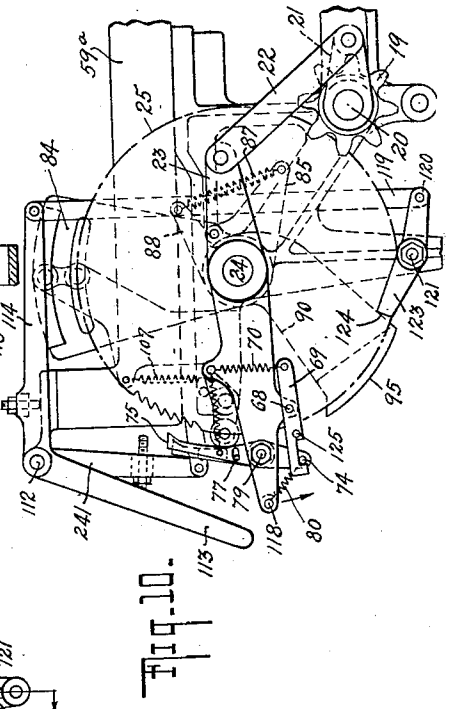
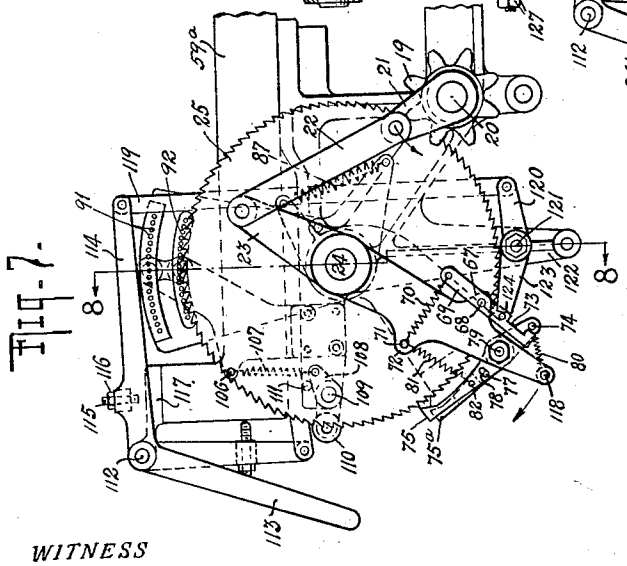


Fig. 7.



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UNITED STATES PATENT OFFICE

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CROSS-FEED MECHANISM

Application filed November 28, 1930. Serial No. 498,612.

This invention relates to automatic machines for the manufacture of cigars and particularly to machines for performing the operation known in the trade as bunching. The machine described in connection with the present invention is designed for the manufacture of cigars in which a single grade or brand of tobacco is used as a filler but the invention is not limited to use with such machine, it being equally applicable to machines in which a plurality of grades of filler tobacco are used to produce a blended cigar.

The principal object of this invention is to provide a new and improved construction for an automatic cigar bunching machine of the general type described in my pending application, Serial Number 155,790, dated Dec. 20, 1926, in which is disclosed an automatic machine for bunching blended cigars, i. e., in which two different grades of filler tobacco are used. The general construction of a portion of my improved machine is similar to that described in said application to which reference is made for a more detailed description of the parts hereinafter to be indicated as similar to the corresponding portions of said bunching machine.

A particular object of the present invention is to provide a novel feeding mechanism, which is disposed cross-wise of the direction of travel of the main feed belt of the machine so that the filler tobacco is fed first to a cross-feed mechanism and thence to the longitudinal feed belt from which the bunching operation is accomplished. Various new and improved constructions, both with respect to the novel cross-feed mechanism and the main feed, which together comprise the invention will be hereinafter described.

Briefly stated, the machine consists of an intermittently actuated, traveling, endless cross-feed belt, flanked by a pair of co-acting belts, upon which the tobacco which is to comprise the filler of the cigar is placed and is thereby carried into the main portion of the machine onto another intermittently actuated, traveling, endless belt disposed longitudinally of the machine and at right-angles to the cross-feed belt, by which second, or main, belt the tobacco is carried forwardly into the machine under a series of pressure plates or series of fingers, adjacent to which is placed an auxiliary feeding device comprising a star wheel cooperating with the main travelling belt to force the tobacco under the retaining plate. After passing under the retaining plate, the tobacco travels into the zone of movement of an intermittently actuated rake which engages the tobacco after it leaves the travelling belt and pushes it forward into a feeding or sizing box normally arranged at the end of, and in alignment with, the travelling belt. After the box, at a certain stage in the cycle of operations of the machine, has been charged with a predetermined amount of the filler tobacco, the charge is cut off and separated. A second rake then engages the tobacco within the sizing box so charged with the filler tobacco and moves it into a transfer box which then transfers the charge to a belt or apron, a plunger being provided for ejecting the charge onto said apron in proper timed relationship. The succeeding operations are then performed as explained in connection with the automatic bunching machine described in my said pending application, Serial No. 155,790, such operations comprising the following steps: A leaf of tobacco, which forms the binder or inner wrapper, is first placed on the apron by the operator before the filler is ejected from the transfer box, and the apron is then automatically actuated to compress and roll the filler within the binder into the desired shape to form a cigar bunch, which is subsequently wrapped and finished by hand. The apron, roller and associated parts have been omitted from the drawings of the instant application as they are of the same general constructions as the similar parts of the bunching machine described in said application. The drawings accompanying the present specification illustrate the portion of the bunching machine up to, and including the sizing box, the front portion of the machine not being shown.

The machine of the present invention operates to perform a cycle of operations which consists of the following steps: feeding the tobacco onto the cross-feed traveling belt;

delivering the tobacco from said cross-feed belt onto the main longitudinal feed belt; pushing the tobacco forwardly into the machine and under the retaining plate; delivering the tobacco into the sizing box whereby the amount of the charge is determined; transferring the charge of filler to the transfer box; actuating the transfer box to bring it into position over the rolling apron; ejecting the charge onto the rolling apron and rolling the filler into the binder to shape the cigar bunch and give the filler the final compression as the binder is rolled and wrapped about it.

For convenience and clarity of description the machine will be described under the following sub-headings:

Framework and main driving mechanism
Tobacco cross-feed mechanism
Cross-feed control mechanism
Main-feed mechanism
Charge regulating device
Clutch actuating mechanism
Sizing box
Transfer box
Cross-feed to main-feed charging device
Operation.

Referring to the accompanying drawings forming a part hereof, in which I have shown, by way of example, as satisfactory construction of a machine embodying the principles of my present invention, Fig. 1 is a plan view of the machine with certain portions of the front of the machine, including the apron, roller, and associated parts omitted; Fig. 2 is a rear view of the machine, the feed-end of the machine being termed the rear thereof; Fig. 3 is a side elevation of the right-hand side of the machine; Fig. 4 is a side elevation of the left-hand side of the machine; Fig. 5 is a transverse section through the machine taken on the line 5—5 of Fig. 1; Fig. 6 is a section on the line 6—6 of Fig. 1; Figs. 7, 9 and 10 are enlarged detail views of the cross-feed timing mechanism showing the sequence of operations of said mechanism; Fig. 8 is a section along line 8—8 of Fig. 7; Fig. 11 is an enlarged fragmentary detail view from the right of the feed control mechanism; Fig. 12 is an enlarged detail view from the left, of the cross-feed control mechanism; Fig. 13 is a detail view of the pusher-arm and mechanism controlling the same; Fig. 14 is a detail view of the cross-feed belt driving mechanism showing the guide-rail for the vertically disposed endless cross-feed belt; Fig. 15 is a section along line 15—15 of Fig. 14; and Fig. 16 is a detail view of the feeding end of the cross-feed structure showing a modified form of knife support in which the knife is disposed at right angles to the direction of travel of the tobacco cutting the same transversely of its direction of travel instead of at an angle thereto as shown in Figs. 1, 3, 5 and 6.

Framework and main driving mechanism

The machine comprises a pair of side frames 10 and 11 suitably maintained in spaced relationship by a top bed plate and a plurality of tie-rods, which tie-rods are also employed as pivots for various moving parts of the machine. Mounted upon a suitable bracket secured to the right hand side frame 11 is an electric motor (not shown) which drives, by means of a belt, worm shaft, worm and worm wheel (not shown) a main drive shaft 12, (Figs. 3, 4 and 5) which shaft has secured thereto a plurality of cams hereinafter to be more fully described. For a more detailed description of the main shaft driving mechanism reference is made to the pending application hereinabove identified. Secured to the main drive shaft 12, (see Figs. 1, 3 and 4) adjacent to the left-hand frame 10, is a sprocket wheel 13 which, by means of a sprocket chain 14, sprocket 15 (mounted upon a stud shaft 15*a*), gear 174 meshing with a pinion 15*b* (mounted upon a bracket 16) drives gear 155 secured to the cross shaft 155*a*, which is caused to be intermittently actuated in a manner hereinafter to be more fully described. The sprocket chain 14 is kept taut under all conditions of operation of the machine by an adjustable roller 14*a*. The above named parts constitute the main driving mechanism of the machine as distinguished from the driving mechanism of the auxiliary, or cross-feed structure hereafter to be described, such main driving mechanism having associated with it a number of cams and other auxiliary actuating devices each of which will be described in connection with the particular part which it actuates.

Tobacco cross-feed mechanism

On the main drive shaft 12 is mounted a second sprocket wheel 17 which drives, by means of the sprocket chain 18, held taut by toothed roller 18*a* adjustably supported in bracket 18*b*, and sprocket 19, a shaft 20. This latter shaft is continuously rotated by the above described driving mechanism and has mounted thereon a rotating crank arm 21 to the outer end of which is connected a link 22 actuating lever 23 whereby an intermittent rotation is imparted to the shaft 24 through the ratchet wheel 25 mounted thereon as described fully hereinafter. Mounted on the shaft 24 is a bevel gear 26 meshing with bevel gear 27 (see Figs. 2 and 5) on the shaft 28 supported within a hub 29 projecting from a bracket 30 depending from the cross-feed frame. The shaft 28 has mounted thereon gear 31 meshing with pinion 32 (Figs. 14 and 15) intermittently actuating, through a train of gears and pulleys illustrated in Fig. 15, the cross-feed belt system. This train comprises mitre gears 33, 34 and 35, 36, the gears 33 and 35 secured to a shaft

37 actuated by the pinion 32 one on each side of a pulley 38 keyed to the shaft 37 and meshing, respectively, with gears 34 and 36. Upon shafts 39 and 40 of said gears 34 and 36 are keyed the pulleys 41 and 42 about which the intermittently travelling endless belts 43 and 44 are adapted to travel. The pulley 38, positioned at right angles to, between the pulleys 41, 42 and immediately below the plane of the lower end surfaces thereof, provides the driving means of the horizontally disposed, endless, intermittently travelling belt 45, the pulley 46 (Figs. 2 and 6) comprising the other terminus of the travel of the belt and being mounted on pulley shaft 47, whose distance from the driving pulley 38 may be adjusted by means of the adjusting bolt 48 (Fig. 6) thereby providing any desired degree of tautness of the belt 45. An idler pulley 49, rotatably mounted on the shaft 47 of a swinging arm 50 and under tension of the spring 51 anchored at one end to the cross-feed supporting frame, and at the other end of the pulley shaft, provides an automatic means of keeping the belt 45 taut. A guide pulley 52 mounted on a bracket 53 of the frame, assists in keeping the belt 45 under the tension necessary for its forward propulsion in proper timed relationship as hereinafter to be explained.

The vertically disposed belts 43, 44 forming, with the horizontal belt 45, an open trough into which the filler tobacco is to be fed by an operator stationed at the rear left side of the machine, immediately in front of the cross-feed mechanism just outlined, travel, at their ends opposite their driving ends, about pulleys 53 and 54 (Figs. 1 and 6). These pulleys are positioned to rotate about their respective shafts 55 and 56 said shafts being adjustable in their distances from the shafts 39, 40, at the drive ends of the travelling belts, by means of the adjusting elements 57, 58. Along the inner sides of the vertically disposed belts 43, 44 are guide rails 43*a* (see Fig. 14) integral with the auxiliary bed plate 59 for keeping said belts in proper alignment and also to serve as a means of keeping the inner stretches of the belts against the edges of the horizontal belt 45 so as to prevent the filler tobacco from being displaced from said belt and falling into the space which might be formed between the belt 45 and belts 43, 44 if the tobacco on belt 45 was fed thereon by an inexperienced operator that it would have a tendency to push the belts 43, 44 out of their positions adjacent the edges of belt 45.

The structure supporting the just described cross-feed belts and associated parts comprises the bed plate 57 auxiliary to the main bed plate 59*a* bolted to the top of, and extending transversely across the machine between the side frames 10 and 11. This auxiliary bed plate, extending sidewise from the machine proper, has side sections 60 and 61 which have bolted on the under-sides thereof, brackets 62 and 63 extending in both directions from, and beyond said side sections. On one side of said side sections, bolted to said supporting brackets 62, 63, and extending toward the rear of the machine is provided a table section 64 a widened portion 65 of which extends over a part of the rear of the machine, being secured to the top of the main table section 65*a*. On the opposite side of the section 60, adjacent the section 61, bolted to the supporting brackets 62, 63, and extending toward the front of the machine, is provided a table section 66 enclosed on three sides by vertical board sections so as to form a box open on the side adjacent the travelling cross-feed belt. Into this box is adapted to be placed a supply of tobacco to be fed therefrom by the operator into the trough formed by the horizontal travelling belt and the two vertically disposed travelling belts hereinabove described.

Cross-feed control mechanism

The mechanism for controlling and timing the travel of the endless belts of the cross-feed system is illustrated in enlarged detail in Figs. 7 to 12, of which, Figs. 7, 9 and 10 show the ratchet wheel 25, its pawls, and associated actuating mechanism in various positions during the sequences of operations to be described. As hereinabove explained, upon the continuously driven shaft 20 is mounted a crank 21 rotating with said shaft and having pivotally connected at its outer extremity, the link 22 connected, in turn, at its outer extremity, to the two-arm lever 23 pivoted about the shaft 24 being rocked upon said shaft by the revolution of the crank 21 about the shaft 20. The outer arm of the lever 23 is provided with a projection 67 having a pin 68 thereon upon which is pivoted a lever 69, one end of which is under the tension of a spring 70 anchored about a pin 71 on a second projection 72 on the other side of the outer arm of the lever 23. At the end of the lever 69, opposite that at which the spring 70 is anchored, is an elongated notch 73 in the side of the lever which notch a pin 74, at the extremity of the pawl 75*a* is adapted to engage as hereinafter described. The pawls 75 and 75*a* comprise, in operation, a unitary structure, the pawls being connected by a pin 77 on the pawl 75*a* engaging a slot 78 provided in the pawl element 75, the pawls being pivoted at 79 on the outer arm of the lever 23, a spring 80, connecting the outer extremity of the pawls to the free end of the lever 23, and a spring 81 anchored on one end to a pin 82 and on the other to the pin 71 on the projection 72 of the outer arm of lever 23, keeping such pawls under tension for engaging the ratchet wheel 25 as hereinafter described.

The point at which the pawl 75 or 75*a*, as the case may be, will, upon its upward travel, engage the ratchet wheel 25 is determined and governed by the setting of an index plate 84 (Fig. 12) whose general outline is that of a sector of a disc whose center is the center of the shaft 24. Said index plate has an angular projection 85 at the extremity of which is provided a pin 86 serving as the anchor pin for a spring 87 anchored at its other end on a pin 88 projecting from the surface, near its extremity, of the angular projecting portion 89 of the plate sector 90 pivoted about the shaft 24. The sector 90 has, at its free end a shoe, the outer periphery thereof forming a race 95 over which the pawls are adapted to ride for preventing the pawls from engaging the ratchet wheel 25 during an interval of the travel of said pawls adjacent the surface of the ratchet wheel. The index plate 84 is provided, near its outer periphery, with a plurality of series of holes 91, 92 arranged in parallel concentric lines, into one of which holes a pin 93 (for the outer series) or pin 94 (for the inner series) is adapted to be inserted. Taking first the outer series of holes, the pawl 75 is prevented from engaging the ratchet wheel 25 before a predetermined distance along the face of the ratchet wheel has been passed by said pawl, by the riding of the pawls 75, 75*a* over the raceway 95 of the plate sector 90, extending beyond the teeth of the ratchet wheel. The position of the raceway 95 along the periphery of the ratchet wheel is determined by a particular hole of the series 91 into which the pin 93 is inserted, the indexing plate 84, and therewith, the plate sector 90, being turned about their pivots to the particular position desired to be assumed by the raceway 95. The pawl 75*a* is provided on the back side thereof with a lug 75*b* which rides over the raceway until it gets to the end thereof when it is permitted to drop from the raceway, causing the pawls 75 and 75*a* to drop onto the ratchet wheel and engage a tooth of said wheel. By providing a second series of concentrically arranged holes 92, the fineness of the adjustment of the raceway 95 along the periphery of the ratchet wheel, is doubled, as the holes of such second series are arranged staggered with respect to the outer series of holes, i. e., so as to have each hole thereof positioned midway between adjacent holes of the outer series. Thus, the indexing plate may be adjusted to any of the positions defined by the total number of holes of both series, giving a half-tooth adjustment, by the insertion into any hole of either the pin 93 or the pin 94, depending upon the series to which such hole belongs. The setting pins 93, 94 are mounted in a duplex casing 96 (see Fig. 8) and retained therein under tension by the springs 97 and 98, respectively, by which they are pressed against the surface of the plate 84 by the pressure of said springs against the plunger blocks 99, 100. By means of the knurled knobs 101, 102 at the ends of the pin shafts and outside the casing 96, the pin 93, or 94 may be withdrawn from any hole into which it has been inserted when a re-adjustment of the indexing plate is to be made.

The casing 96 forms an integral part of the upper end of a bracket 103 of irregular configuration and secured to the main frame by bolts 104 (Figs. 7 to 12). The bracket 103 has a projecting portion 105 on which is provided a pin 106 for anchoring a spring 107 connected at its other end to one arm of a crank lever 108 pivoted at 109, the other arm of said crank lever having mounted thereon a roller 110 projecting beyond the periphery of the ratchet wheel 25. A pin 111, provided on the frame on which the bracket 103 is secured and in the zone of movement of the crank lever 108 acts as a stop for said lever in its movement about the pivot 109, as hereinafter more fully described.

Pivoted on a shaft 112 passing through a projecting portion of the main frame is a bell crank lever having a depending arm 113 and an arm 114, the movement of the latter arm downwardly being limited by an adjusting screw 115 having a locking nut 116 thereon. The screw 115 is adapted to abut against the upper surface of the bracket 117 secured to an extension of the main frame thus arresting the downward travel of the arm 114. The outer arm of the lever 23 has, at its extremity, a pin 118 adapted, in the course of the upward travel thereof, and after the pawls 75 and 75*a* have engaged the ratchet wheel 25, to abut against the depending arm 113 causing said arm to rock the shaft 112 and thereby the arm 114 to be depressed. At the outer end of the arm 114 is connected a link 119 depending therefrom to one arm 120 of a lever pivoted upon a shaft 121 passing through a depending bracket 122, the other arm 123 of said lever extending in the opposite direction and having the abutting end surface 124 adapted to engage a pin 125 on the lever 69. Surrounding the shaft 121 is a friction spring 126 at the outer end thereof (see Fig. 8) for keeping the lever 120—123 under tension and adjustable by nuts 127, 128 at the ends of said shaft.

Main-feed mechanism

Located midway between the side frames 10 and 11, and travelling lengthwise of the machine is an endless belt 150 (see Figs. 1, 3 and 5) trained about a rear roller 151 and a front roller 152 (Fig. 5), the upper reach of the belt forming a horizontally extending movable platform upon which the tobacco is received from the cross-feed belt 45 and while supported thereon, carried into the main portion of the machine. The front roller 152

is driven by means of gears 153 and 154, the gear 153 being secured to the roller 152, and the gear 154 to the feed mechanism actuating shaft 155*a*. Located adjacent the front roller 152 and slightly above the belt is a stationary plate 156 between which and the upper surface of the belt the tobacco is confined as it travels forwardly. The plate 156 is in the form of a plurality of finger-like extensions of a casting 157 bolted to the bracket 158. Secured to the shaft 155*a* is a longitudinal hub 159 carrying a star wheel 160, the periphery of said star wheel being milled out to form a plurality of teeth terminating closely adjacent to the upper run of the belt 150. The star wheel and belt are intermittently actuated by mechanism, hereinafter briefly described, to operate in unison, the teeth of the wheel engaging the tobacco on top of the belt and feeding it under a second plate 161 having a plurality of finger-like extensions disposed toward the front of the machine. After the tobacco is fed under said plate, it passes to a stationary table or shelf 162 and is carried forwardly across said table by the rake 163.

The manner of supporting and actuating the rake 163 will not be described in detail herein, reference being made to my pending application, Serial Number 155,790, in which such supporting and actuating mechanism, as well as all of the mechanism of the main feeding means not herein specifically described, is shown and described in detail. With respect to the rake 163, it will suffice to explain that it is first moved horizontally and forwardly along the shelf 162, carrying the tobacco with it, after which the rake is raised and moved backwardly and then permitted to drop again with its tines engaging the tobacco.

Charge regulating device

A knife 164 (see Fig. 1) spring pressed against its support and mounted thereon by bolts 164*a*, extends across the machine from the left side toward the center thereof and closely adjacent to the forward end of the shelf 162 (see Fig. 5). The knife is pivotally mounted at one end upon a short stub shaft 165 the axis of which extends longitudinally of the machine. A depending leg 166 (see Fig. 3) at the other end of the knife has pivotally secured thereto, the upper end of an adjustable connecting link 167, the lower end of which is secured to a pivot block 168 at the outer end of a cam lever 170 which is pivotally supported on the pivot shaft 171 and carries a cam roller 172 which engages within the race of a cam 173 secured to the main drive shaft 12.

The cam 173, as shown in Fig. 3, causes the knife 164 to be swung upwardly and downwardly in proper predetermined relationship to the movement of the other parts to cut through the layer of tobacco that was fed forwardly by the belt 150 and rake 163.

Clutch actuating mechanism

For a detailed explanation of the clutch actuating mechanism, reference is again made to my pending application hereinabove identified. A skeleton description only of such mechanism is herein given for the purpose of assisting in the identification of the various parts illustrated in the accompanying drawings with those shown in the drawings of said application.

The sprocket 15, hereinbefore referred to (see Figs. 1, 4 and 5) by means of which the motive force is transmitted from the shaft 12 to the stud shaft 15*a* is directly mounted upon said shaft 15*a*, causing the sprocket 15 to rotate upon said shaft to which is secured a spur gear 174 meshing with a pinion 15*b* on the bracket 16, driving gear 155 secured to the cross-shaft 155*a*. The ratchet wheel 175 is keyed to the boss of said spur gear rotatably mounted on a hollow sleeve on the shaft 155*a*, the three members, namely the sprocket 15, the spur gear 174, and the ratchet wheel 175, rotating in unison. A pawl tooth 175*a* provided on a U-shaped member 176 is adapted (at predetermined periods) to be held out of engagement with the teeth of the ratchet wheel 175 by means of a spring 177 when the rotation of the ratchet wheel 175 will not be operative to cause any movement of the parts beyond said ratchet wheel. A second ratchet wheel 178, having a stop pawl (not shown) adapted to be moved out of engagement with the teeth of said ratchet wheel, is also provided, a spring 179 serving to pull said ratchet wheel in a direction which will bring the pawl tooth above referred to into engagement with the teeth of the ratchet wheel 175 against the action of spring 177. When this occurs, the hollow sleeve on shaft 155*a*, which hollow sleeve carries the cams for actuating the feed rake 163, is rotated, thereby putting the feed actuating mechanism in operation.

Sizing box

Located in longitudinal alignment with the feeding belt 150 for cooperation with the sizing box 180 (Fig. 5) in position before said belt, is a second rake (not shown) to which is imparted a swinging movement forwardly and rearwardly of the machine for effecting the feeding of the tobacco through the sizing box. In addition to this forward and rearward movement, the rake is also given an upward and downward oscillating movement, so that the full movement of the rake is a compound movement. The purpose of the upward and downward swinging movement of the rake is to move the rake over the top of the tobacco as the rake is moving rear-

wardly and to engage behind the tobacco in the sizing box before said rake starts moving forwardly. The forward travel of the rake is of sufficient extent to pull the charge of tobacco out of the sizing box and into the transfer box 181. For a description of the mechanism whereby the compound movement of the rake is effected, reference must once more be made to my pending application hereinabove referred to.

Transfer box

The transfer box 181, as clearly shown in Fig. 5, is secured upon the upper end of a casting 182 having a pair of side arms pivotally mounted at their lower ends upon a stub shaft 183. Said casting is provided with a short crank arm 184 to the outer end of which is connected one end of a short adjustable connecting link 185. The other end of the connecting link 185 is pivotally connected to one end of a cam lever 186, the other end of which is pivotally supported upon the pivot shaft 171. Between its ends, the lever is provided with a cam roller 187 which engages within the race of a cam 188.

The cam 188 secured to the main shaft 12 is designed to cause the transfer box 181 to be moved, shortly after the rake (not shown) referred to under the preceding sub-heading, reaches its forward limit of travel, from the position shown in Figs. 1 and 5 to a position above a belt or apron, having a binder or inner wrapper thereon onto which the tobacco is ejected from the transfer box. The tobacco is then shaped to form a cigar bunch and subsequently wrapped and finished.

Cross-feed to main-feed charging device

Returning now to a description of the mechanism regulating the charge of tobacco from the cross-feed belt to the main-feed belt and the device for regulating said charge to the capacity of the machine, the tobacco travelling upon the cross-feed belt 45 is first somewhat compressed by the action of a roller weight 189 having a knurled peripheral surface and rotatably supported on a shaft 190 at the end of a lever 191 pivoted at 192 on the knife structure supporting bracket 193 extending upwardly from and secured to the auxiliary bed plate 59 of the machine. (See Figs. 2 and 6.) The tobacco, thus compressed by the weight 189, is fed under a presser plate 194. Shortly in advance of the point at which the tobacco emerges from under the presser plate 194, is positioned the knife 195 mounted, at an angle to the direction of travel of the tobacco, upon a support 196 provided at the lower end of a rod 197 mounted for vertical movement in projections 198, 199 of the bracket 193. (See Figs. 2, 3, 5, and 6.) Adjustably secured to the rod 197 is one arm 201 of a bell crank member 202 mounted on the rod 197 and secured thereon at any desired position by set screw 203. The rod 197, carrying the knife 195 at its lower end is reciprocated by a lever 206 pivoted at its center on a pivot shaft 207 mounted in an extension 208 of the bracket 193. The other end of said lever is connected, through a link 209, to a connecting rod 210 which, in its turn, is connected, through a link 211, to the end of a cam lever 212 (see Fig. 5), pivoted at its other end on the shaft 25 and carrying at a point intermediate its ends, a cam roller 213 which engages within the race of a cam 214 secured to the cam shaft 20. The cam 214 causes the knife 195 to be swung upwardly and downwardly in proper predetermined relationship to the movement of the other parts, to cut through the layer of tobacco fed by belt 45. Through the arm 201 passes a rod 204 slidably mounted in the brackets 198 and 199 about which, immediately below the arm 201, is coiled a compression spring 205 anchored on the rod at 205*a*, against which spring, when the knife 195 is lowered to cut off a charge of tobacco from the main supply being fed on the belt 45, the arm 201 presses to cause the presser plate 194 to be lowered and pressed against the portion of the tobacco in front of the knife and shelf plate 201*a*. The layer of tobacco on belt 45 is held down in advance of the knife by the pressure plate 194 and in the rear of the knife by the fingers 215 actuated by a link 216 (see Figs. 3 and 5) the link being connected at the lower end thereof to a pin 218 at the end of a short crank arm of said fingers adapted to pivot the same on the pivot bar 219, pressing the fingers against the tobacco. The link 216 has a vertical slot 220 therein in which travels a pin 221 projecting from the extremity of an arm 222 of the bell crank arm member 202. The pin 221 is connected by a tension spring 223 anchored on a pin 224 at the upper end of the link 216, the spring 223 serving as a tension means for the fingers in holding the tobacco on the shelf plate 201*a* during the cutting operation and also to return the link and fingers to their original positions after the knife has cut through the tobacco.

The device for regulating the forward feeding of the charge of tobacco, received by the main belt 150 from the cross-feed belt 45, to the capacity of the machine for taking care of such charge, comprises a pusher arm 225 and associated mechanism best illustrated in Figs. 3 and 13. As a batch of tobacco is cut off from the main supply on the shelf 201*a* by the knife 195, the pusher arm 225 propels such batch forward from said shelf onto the main belt 150 only if such tobacco may be fed forwardly without jamming the bunch against the tobacco previously fed. In other words, the pusher arm and associated mechanism hereinafter described, controls the feeding of tobacco from the cross-

feed belt to the main belt to prevent a jamming of tobacco filler on the main belt, the pusher arm being inoperative to feed tobacco forwardly unless the machine has used up the tobacco already fed to the main belt.

The pusher arm 225 is pivoted on a cross bar 226 at one end of a lever 227 pivoted at its other end on the shaft 24. Also on the shaft 24 is mounted a bell crank lever 229 to one arm of which is connected, through a connecting link 230, a cam lever 231 pivoted on pivot shaft 232 on the frame 233 bolted to the main bed plate. Intermediate the ends of the lever 231 is a roller 234 engaging the race of a cam 235 mounted on the cam shaft 20 and designed to cause an intermittent forward and backward movement to be imparted to the pusher arm 225. At the extremity of the second arm of the bell crank lever 229 is a pin 236 upon which is anchored one end of a spring 237, the other end of said spring being anchored about a pin 238 on the lever 227. The pin 238 is adapted to move within a slot 239 in a link 240 the other end of the link 240 being connected to an arm 241 secured to the cross shaft 112 mounted in bearing brackets 117 and 117*a*. Intermediate the ends of the arm 241 is provided an adjustable stud 244 having a locking nut 245 thereon to limit the movement of said shaft 112. Integral with the lever 227, on the shaft 24 is a projection 246 which abuts against a stop pin 247 on the arm of the bell crank lever 229. As the pusher arm 225 is moved forward by the link mechanism just described, the lever 240 is drawn to the left in Fig. 13 by the pin 238, pulling with it the lever 241 and oscillating shaft 112 which extends across the back of the machine (see Fig. 2), and having the arm 113 of a bell crank lever mounted thereon (Figs. 7 to 10). After the tension spring 237 has brought the pusher arm 225 forward by means of the lever 227, the bell crank lever 229 is reciprocated, and the pusher arm 225 is given its backward movement by the pin 247 pushing against projection 246. So long as the pusher arm is making its full forward movement, the pin 238 pulls on lever 240, turning shaft 112 and thereby bringing the lever 113 into the path of the pin 118 on the extremity of the lever 23.

In Fig. 16 of the drawings, I have shown a modified form of the structure supporting the knife 195 whereby said knife is mounted so as to present a cutting edge at right angles to the direction of travel of the supply of tobacco fed from belt 45, instead of at an acute angle as shown in Figs. 2, 3 and 6. The knife 248 is secured to the support 196 by means of two screw bolts 249, provided with springs 251, 252 between their heads and said knife 248 whereby the knife is pressed against two guide blocks 253, 254, one on each side of the path through which the tobacco is fed. The knife 248 is thus made to cooperate, in its downward swing with the edge of a plate 255 (Fig. 6), to produce a perfect shearing of the tobacco by the slanting cutting edge of the knife and said edge as the tobacco is fed under said knife.

Operation

The general operation of the machine is as follows:

The feeding operator stationed at the left side of the machine and to the rear of the cross-feed mechanism keeps the belt 45 well supplied with filler tobacco which she can merely push from the table section 66 onto such belt, the level of such table section being the same as the level of the top edge of the vertically disposed cross-feed belt 44. The work of the operator at the feeding end of the machine may be said to be entirely independent of the work of the operator at the front or finishing end of the machine, all that is required of the feeding operator being to keep the trough formed by the belts 43, 44 and 45 supplied with tobacco, uniform feeding not being necessary.

The cross-feed mechanism and the main-feeding mechanism being in operation as hereinbefore described, the upper run of the belt 45 and the belt 43—44 moves forwardly and carries the tobacco which has been placed thereon by the feeding operator under the presser plate 194, after which the knife 195 descends to cut off an amount of tobacco from the main supply belt 45. The tobacco thus cut off is now on the shelf 201*a* (see Figs. 5 and 6) from which the tobacco is pushed forwardly by the pusher arm 225 onto the main-feed belt 150. The upper run of the main-feed belt moving forwardly carries the tobacco under the stationary plate 156 and then the star wheel 160. The rotation of the star wheel, in cooperation with the forward travel of the main-feed belt, carries the tobacco forwardly and delivers it to the zone of movement of the rake 163 onto the shelf 162. The charge of tobacco thus severed from the supply on belt 150 is now pushed by the rake 163 into the open rear end of the sizing box 180, at the rear end of which the tobacco is cut or sheared by the descending knife 164. The second rake (not shown in the drawings) is then effective to pull the charge from the sizing box into the transfer box 181.

The mechanism regulating the charge of tobacco fed from the cross-feed belt to the main-feed belt is so designed that an excessive building up of such charge upon the main feed belt resulting in a jamming of tobacco on such belt is avoided. Referring particularly to Fig. 13, the pusher arm 225 is reciprocated by means of the lever 227 to push tobacco from the shelf 201*a* onto the belt 150 so long as the amount of tobacco on the belt 150 is not more than required by the capacity of the remaining portions of the machine to

take care of such tobacco. The lever 227 in its forward movement during the normal operation of the machine under conditions in which no jamming of the tobacco on belt 150 exists pulls with it the link 240 which has the effect of imparting to the shaft 112 located at the rear of the machine an oscillating movement. The oscillation of the shaft 112 causes through the arm 114 the link 119 to be given an upward and downward movement, thereby causing the abutting end surface 124 of the arm 123 of the lever pivoted upon the shaft 121 to be brought into the path of the pin 125 of the lever 69 resulting in the freeing of the pin 74 from within the slot 73 of said lever 69 when said lever 69 is brought downwardly with the arm 23.

Referring to Figs. 7 to 10 inclusive, it will be noted that on every cycle of the machine the ratchet pawl 75 or 75*a*, as the case may be, on the arm 23 is brought into and out of engagement with the ratchet wheel 25 unless the tobacco becomes jammed in its path on the main belt 150. Fig. 7 shows the parts of the control mechanism at the beginning of the upward movement of the pawls 75, 75*a* along the outer periphery of the ratchet wheel 25. Fig. 9 shows the mechanism at the beginning of the downward movement of the pawl structure along the periphery of the ratchet wheel, the position of the parts being shown at the maximum travel of the arm 23. Fig. 10 shows the mechanism during the downward movement of the pawl structure, the parts being shown in an intermediate position of the arm 23.

During the normal operation of the machine, i. e. when tobacco is fed continuously from the shelf 201*a* by the pusher arm 225, there being no jam in front of such pusher arm, the lever 227 is given a full forward movement by the link mechanism associated with cam 235 continuously rotating about shaft 20. The pin 238 on said lever, engaging the end of the slot 239 on the link 240, pulls said lever to the left, as seen in Fig. 13, giving the shaft 112 a clockwise rotative movement. Coming now to Fig. 7, the shaft 112 as viewed in such figure, moves counterclockwise, bringing the lever 113, rigidly connected to said shaft, toward the right and into the path of movement of the pin 118 at the end of the arm 23 as said arm revolves about shaft 24. At the same time that the lever 113 moves to the right (Fig. 7) the arm 114, integral therewith, is raised, raising the link 119 and thereby bringing the abutting end surface 124 of the arm 123 into the position shown in Fig. 7, in which it will be in the path of the pin 125 on the lever 69 causing the pin 74 when the arm 23 descends to be dislodged from the slot 73 and to take its position at the extremity of the lever 69 as shown in Figs. 7 and 9. In the upward travel of the arm 23 the pawls 75 and 75*a* are kept out of engagement with the ratchet wheel 25 by reason of the block or lug 75*b* riding on the face of the race 95 until said lug passes beyond the end of the race when the pawl 75 or 75*a*, as the case may be, will engage and rotate the ratchet wheel, putting in operation the cross-feed actuating mechanism.

On the return stroke of the arm 23 (Fig. 9) the lug 75*b* of the pawl structure comes in contact with the roller 110, throwing the pawl out of engagement with the ratchet wheel. The pawl is then held out of engagement by means of the locking arm or lever 69 until said lever has been unlocked by the striking of pin 125 against the abutting end surface 124 of the arm 123.

This locking and unlocking operation is performed on every cycle of the machine movement so long as there is no jamming of the tobacco on the main-feed belt. If a jamming of the tobacco on the main-feed belt occurs, the pusher arm 225 and the lever 227 will not take their full movement to the left as viewed in Fig. 13 and will therefore not have the pin 238 pull the link 240 to the left. Under these conditions the shaft 112 will not be given its oscillating movement and the lever 113 will therefore not be brought to the right in Fig. 7, i. e., into the path of movement of the pin 118 at the end of the arm 23 and the abutting end surface 124 will therefore remain in the position thereof shown in Figs. 9 and 10. The pin 125 on the lever 69, not being engaged by the abutting end surface 124, the pin 74 will not be displaced from its position within the slot 73, and the pawl structure will therefore ride inoperatively adjacent the periphery of the ratchet wheel without having one of its pawls engage a tooth of said ratchet wheel. The ratchet wheel will therefore remain stationary, no tobacco will be fed from the cross-feed belt 45 onto the shelf 201*a* and the pusher arm 225 will not push against additional tobacco already jammed on belt 150. As soon as the tobacco in front of the pusher arm 225 has been moved forwardly into the major portion of the machine so that the lever 227 can be given its full forward movement (Fig. 13), the pin on said lever will assume its function of pulling the link 240 to the left and bringing the ratchet wheel actuating mechanism just described into operation in the manner explained.

The amount of movement of the ratchet wheel 25 is predetermined by the position of the plate sector 90 and therefore of the race 95 thereof operating in conjunction with the lug 75*b* of the pawl structure. The pawls of the pawl structure are kept out of engagement with the teeth of the ratchet until the lug 75*b* rides off of the projecting end of the race 95. By the adjustment of the index plate 84 as hereinabove explained and therefore of the plate sector 90 and its race 95 to a

particular position along the periphery of the ratchet wheel 25, the amount of movement of the ratchet wheel, i. e. the particular place where the pawl 75 or 75*a* as the case may be, will engage a tooth of said ratchet wheel, can be predetermined. As hereinbefore explained the staggered disposition of the holes of the two series 91, 92 gives a half-tooth fineness of adjustment of the raceway 95 along the periphery of the ratchet wheel.

From the foregoing description it will be seen that my automatic bunching machine is provided with a number of control or safety devices which will prevent the breakage of any part which is placed under particular strain at such times, for instance, as when the feeding of the tobacco to the cross-feed mechanism is so great that the remaining portion of the machine is unable to take care of the amount of tobacco so fed. In this way the feeding of tobacco to the machine is made entirely independent of the operation of the machine. The control system and mechanism is entirely automatic so that the operator at the feed end of the machine is not burdened with the task of keeping a careful watch on the progress of tobacco through the machine. The devices both in connection with the regulation of the charge of tobacco from the cross-feed belt to the main-feed belt and in connection with the regulation of said charge to the capacity of the machine for bunching the tobacco into the shape of a cigar are entirely automatic in operation and control.

The amount of movement of the ratchet wheel 25 is predetermined by the position of the plate sector 90 and therefore of the race 95 thereof. The pawls of the pawl structure are kept out of engagement with the teeth of the ratchet wheel before such pawl structure has passed the roller 110 by means of the race 95 upon which it rides until the forward end of the pawl structure reaches the roller 110. By the adjustment of the index plate 84 as hereinabove explained and therefore of the plate sector 90 and its race 95 to a particular position along the periphery of the ratchet wheel 25, the amount of movement of the ratchet wheel, i. e. the particular place where the pawl 75 or 75*a* as the case may be, will engage a tooth of said ratchet wheel, can be predetermined. As hereinbefore explained the staggered disposition of the holes of the two series 91, 92 gives a half-tooth fineness of adjustment of the raceway 95 along the periphery of the ratchet wheel.

From the foregoing description it will be seen that my automatic bunching machine is provided with a number of control or safety devices which will prevent the breakage of any part which is placed under particular strain at such times, for instance, as when the feeding of the tobacco to the cross-feed mechanism is so great that the remaining portion of the machine is unable to take care of the amount of tobacco so fed. In this way the feeding of tobacco to the machine is made entirely independent of the operation of the machine. The control system and mechanism is entirely automatic so that the operator at the feed end of the machine is not burdened with the task of keeping a careful watch on the progress of tobacco through the machine. The devices both in connection with the regulation of the charge of tobacco from the cross-feed belt to the main-feed belt and in connection with the regulation of said charge to the capacity of the machine for bunching the tobacco into the shape of a cigar are entirely automatic in operation and control.

It will be understood that although I have described and illustrated a machine designed for the automatic performance of a cigar bunching operation in which a single grade or brand of tobacco is used as a filler, my invention is not limited in its use to a machine in which a straight filler cigar is to be made but may obviously be adapted to a machine in which blend filler cigars are to be manufactured by the simple expedient of providing a pair of cross-feed mechanisms such as described in the instant application, one on each side of the two main belts of a blended cigar bunching machine, such as described and claimed in my copending application, Serial No. 155,790.

I claim:

1. In a cigar bunching machine having a cross-feed belt and a main-feed belt for filler tobacco, mechanism for regulating the charge of tobacco fed from the cross-feed belt to the main-feed belt, including a pivot shaft, a pivoted arm mounted on said shaft for oscillating movement about such shaft, a ratchet wheel, a pawl structure mounted on the end of said pivoted arm and having a pawl adapted to come into engagement during the normal operation of the machine with a tooth of said ratchet wheel to give said ratchet wheel a predetermined amount of rotative movement whereby the cross-feed belt is given an intermittent predetermined amount of forward movement, a locking lever on said pivoted arm having a notch, a pin on said pawl structure adapted to be locked in said notch when the pawl structure is to ride inoperatively adjacent the periphery of said ratchet wheel, to cause said ratchet wheel to be inoperative to actuate said cross-feed belt.

2. In a cigar bunching machine having a cross-feed belt and a main-feed belt for filler tobacco, mechanism for regulating the charge of tobacco fed from the cross-feed belt, including a pusher arm adapted to be reciprocated to push tobacco fed from said cross-feed belt onto said main-feed belt, a pivot shaft, a pivoted arm mounted on said shaft for oscillating movement about such shaft, a ratchet wheel, a pawl structure mounted on the end of said pivoted arm and having

a pawl adapted to come into engagement during the normal operation of the machine with a tooth of said ratchet wheel to give said ratchet wheel a predetermined amount of rotative movement whereby the cross-feed belt is given an intermittent predetermined amount of forward movement, a locking lever on said pivoted arm having a notch, a pin on said pawl structure, a lever having an abutting end surface controlled through a link mechanism by said pusher arm to bring said abutting end surface into the path of the pin on the locking lever when said pivoted arm descends, to unlock the pin on said pawl structure whereby the pawl is again brought in position to engage the ratchet wheel upon the upward travel of said pivoted arm to cause the ratchet wheel to be advanced and put the cross-feed actuating mechanism into operation.

3. In a cigar bunching machine having a cross-feed belt and a main-feed belt for filler tobacco, mechanism for regulating the charge of tobacco fed from the cross-feed belt, including a pusher arm adapted to be reciprocated to push tobacco fed from said cross-feed belt onto said main-feed belt, a pivot shaft, a pivoted arm mounted on said shaft for oscillating movement about such shaft, a ratchet wheel, a pawl structure mounted on the end of said pivoted arm and having a pawl adapted to come into engagement during the normal operation of the machine with a tooth of said ratchet wheel to give said ratchet wheel a predetermined amount of rotative movement whereby the cross-feed belt is given an intermittent predetermined amount of forward movement, a locking lever on said pivoted arm having a notch, a pin on said pawl structure, a lever, having an abutting end surface, controlled through a link mechanism by said pusher arm to bring said abutting end surface out of the path of said pin on the locking lever when said pivoted arm descends and to maintain said abutting end surface out of said path, whereby the ratchet wheel remains inoperative to actuate said cross-feed belt.

4. In a cigar bunching machine having a cross-feed belt and a main-feed belt for filler tobacco, mechanism for regulating the charge of tobacco fed from the cross-feed belt to the main-feed belt, including a pivot shaft, a pivoted arm mounted on said shaft for oscillating movement about such shaft, a ratchet wheel, a pawl structure mounted on the end of said pivoted arm and having a pawl adapted to come into engagement during the normal operation of the machine with a tooth of said ratchet wheel to give said ratchet wheel a predetermined amount of rotative movement whereby the cross-feed belt is given an intermittent predetermined amount of forward movement, a locking lever on said pivoted arm having a notch, a pin on said pawl structure adapted to be locked in said notch when the pawl structure is to ride inoperatively adjacent the periphery of said ratchet wheel thereby causing said ratchet wheel to be inoperative to cause the forward movement of said cross-feed belt, a lever, having an abutting end surface, controlled through a link mechanism by said pusher arm, means including a pin on said locking lever for holding said pawl out of engagement with said ratchet wheel until said lever has been unlocked by the striking of the pin thereon against the abutting end surface of the lever controlled by said pusher arm.

5. In a cigar bunching machine having a cross-feed belt and a main-feed belt for filler tobacco, mechanism for regulating the charge of tobacco fed from the cross-feed belt to the main-feed belt, including a pivoted arm, a ratchet wheel, a pawl structure mounted on the end of said pivoted arm and having a pawl adapted to come into engagement during the normal operation of the machine with a tooth of said ratchet wheel to give said ratchet wheel a predetermined amount of rotative movement, a locking lever on said pivoted arm having a notch, a pin on said pawl structure, and means for locking and unlocking said pin into and out of said notch upon every cycle of the machine so long as no jamming of tobacco occurs in front of said pusher arm.

6. In a cigar bunching machine having a cross-feed belt and a main-feed belt for filler tobacco, mechanism for regulating the charge of tobacco fed from the cross-feed belt to the main-feed belt, including a pusher arm, a pivoted arm, a ratchet wheel, a pawl structure mounted on the end of said pivoted arm and having a pawl adapted to come into engagement during the normal operation of the machine with a tooth of said ratchet wheel to give said ratchet wheel a predetermined amount of rotative movement, a locking lever on said pivoted arm having a notch, a pin on said pawl structure, a lever having an abutting end surface, controlled through a link mechanism, by said pusher arm, and means for stopping the forward travel of said cross-feed belt when a jamming of tobacco in front of said pusher arm occurs, including mechanism for retaining the abutting end surface of the lever controlled by said pusher arm out of the path of the pin on said locking lever, whereby said pawl structure will ride inoperatively along the periphery of the ratchet wheel.

7. In a cigar bunching machine, an intermittently actuated, traveling, endless cross-feed belt flanked by a pair of coacting vertically disposed belts, a knife at the end of said belt for severing a quantity of tobacco from the supply on said cross-feed belt, a main-feed belt, intermittently actuated and dis-

posed to travel longitudinally of the machine and at right-angles to the cross-feed belt, adapted to carry tobacco fed thereon from said cross-feed belt forwardly into the machine, mechanism for regulating the charge of tobacco fed from the cross-feed belt to the main-feed belt, including a stationary shelf, a pusher arm adapted to push tobacco from said shelf onto the main-feed belt, a pivoted lever for reciprocating said pusher arm and having a crank lever mounted at the pivot end thereof, a link connecting one of the arms of said crank lever to the free end of a second lever pivoted upon the machine frame, a cam mounted on a cam shaft for continuous rotation, a roller mounted on said lever intermediate the ends thereof engaging the race of said cam, an oscillating shaft operatively connected to said pivoted lever and ratchet mechanism for imparting an intermittent forward movement to said cross-feed belt upon the full forward movement of said first mentioned pivoted lever.

8. In a cigar bunching machine, an intermittently actuated, traveling, endless cross-feed belt flanked by a pair of coacting vertically disposed belts, a knife at the end of said belt for severing a quantity of tobacco from the main supply on said cross-feed belt, an intermittently actuated, travelling, endless main-feed belt, disposed longitudinally of the machine and at right-angles to the cross-feed belt, adapted to carry the tobacco fed thereon from said cross-feed belt forwardly into the machine, and mechanism for regulating the charge of tobacco so fed including a pusher arm, a pivoted lever for reciprocating said pusher arm, a cam and associated link mechanism for imparting a forward and backward movement to said lever, a pin on said lever, a link provided with a slot engaged by said pin, an oscillating shaft connected to said link and adapted to be oscillated by the engagement by said pin of one end of said slot, a double armed lever rigidly connected to said oscillating shaft, a ratchet wheel controlling the movement of said cross-feed belt, and means controlled by the arms of said double armed lever to bring about a uniform, predetermined rotation of said ratchet wheel when the pusher arm is capable of pushing tobacco along the main cross belt without jamming the tobacco in front of said pusher arm.

In witness whereof I have hereunto set my hand.

WALTER H. SCHUSSLER.