Sept. 16, 1924. 1,508,445

L. K. DAVIS

CUT-OFF MECHANISM

Filed May 17, 1921 4 Sheets-Sheet 1

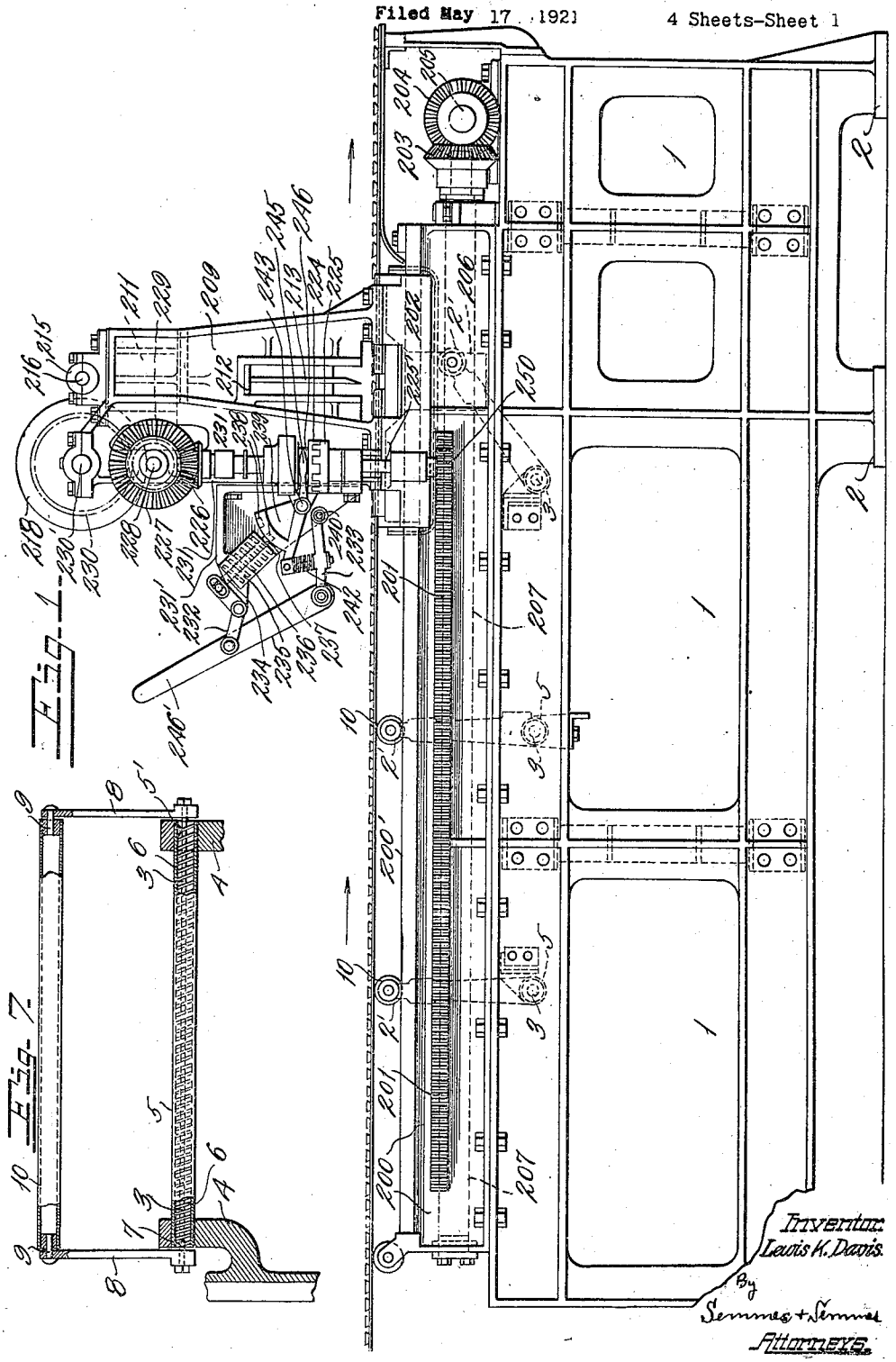


Fig. 1.

Fig. 7.

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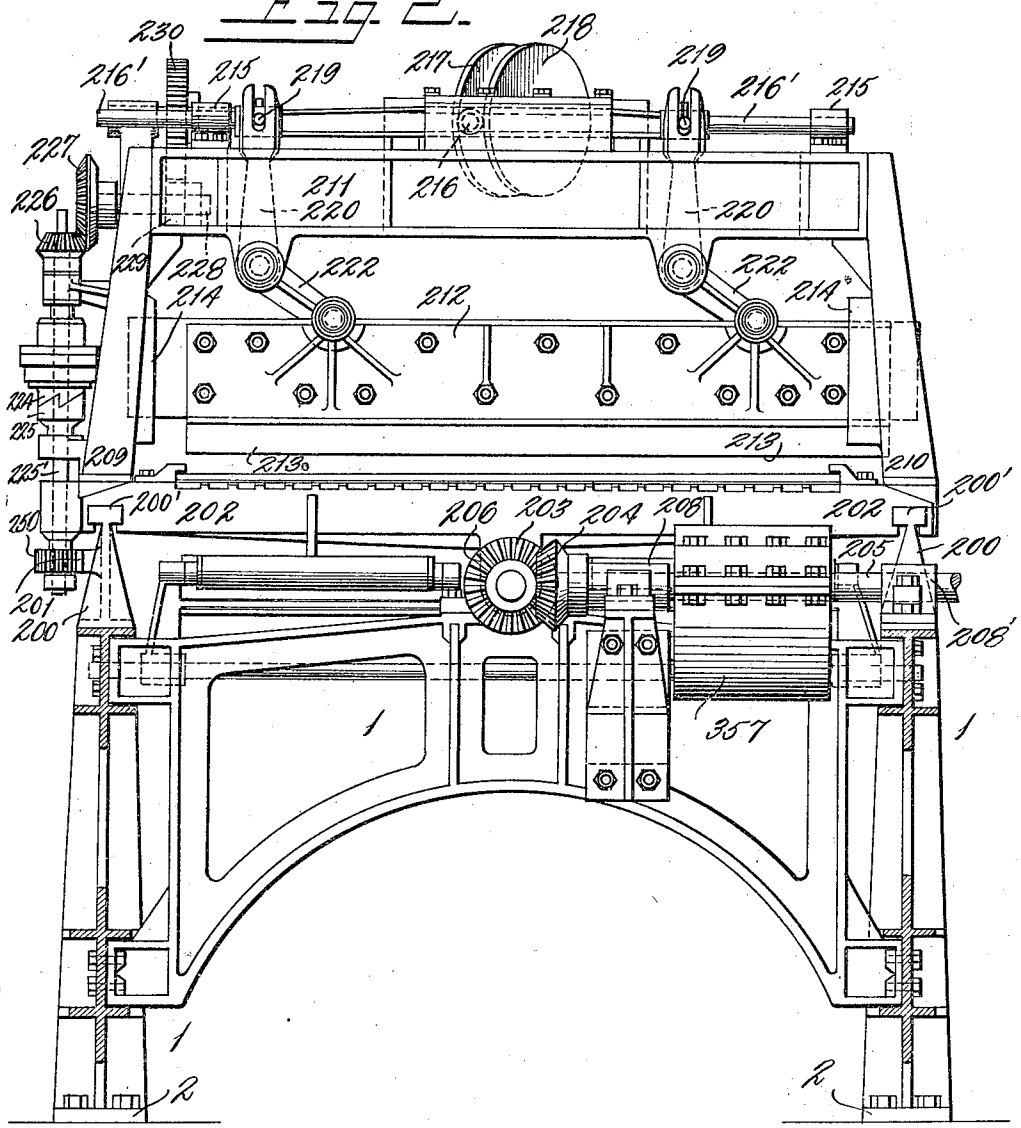
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Fig. 2.



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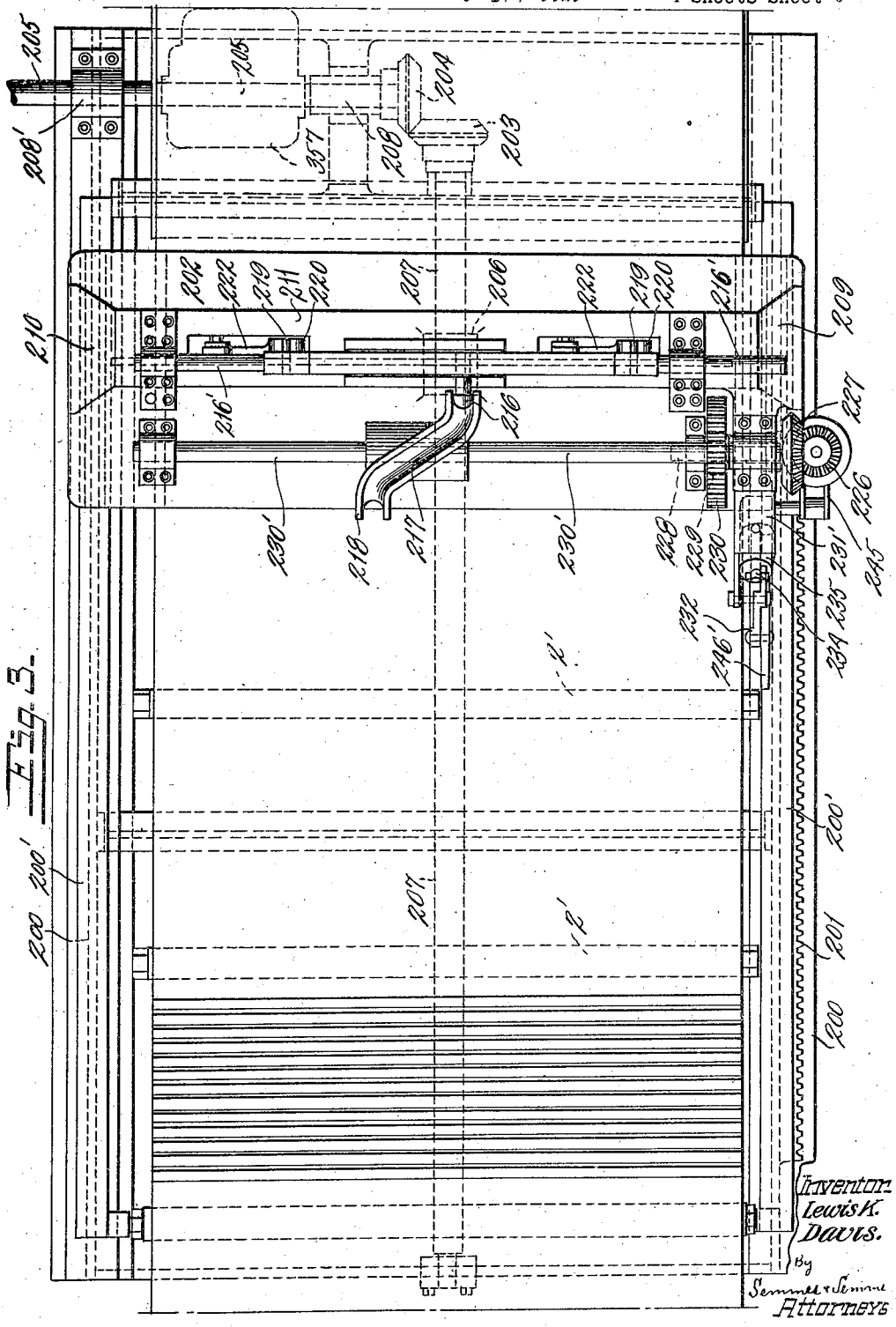


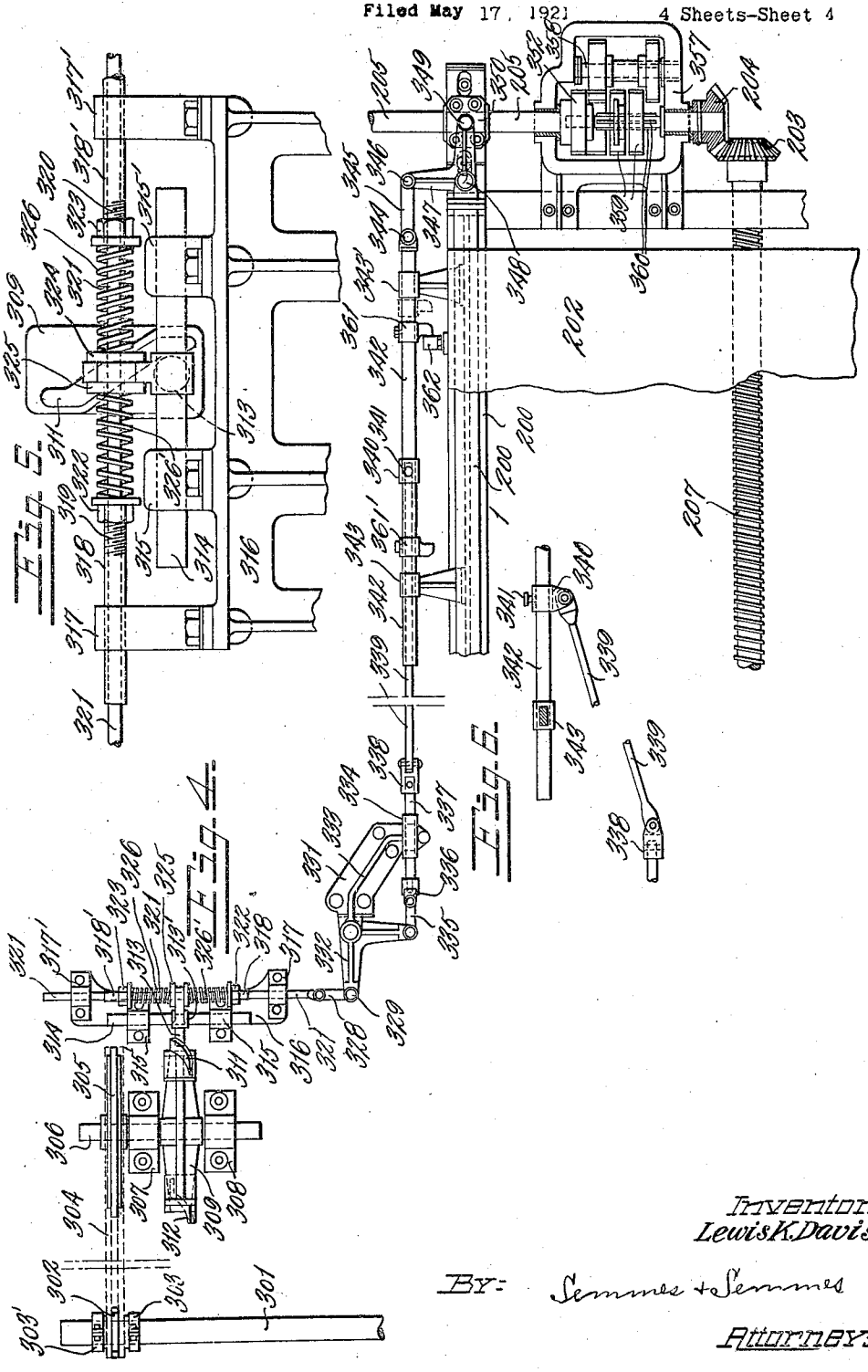
Fig. 3.

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Filed May 17, 1921 4 Sheets-Sheet 4



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UNITED STATES PATENT OFFICE.

LEWIS K. DAVIS, OF NEW YORK, N. Y., ASSIGNOR TO VAUGHN CAMP, OF NORFOLK, VIRGINIA.

CUT-OFF MECHANISM.

Application filed May 17, 1921. Serial No. 470,470.

To all whom it may concern:

Be it known that I, LEWIS K. DAVIS, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Cut-Off Mechanism, of which the following is a specification.

This invention relates to certain new and useful improvements in cutting machines and it is particularly adapted for the purpose of cutting stiffened fabrics such as cardboard, pasteboard, packing material or wall board and it has been especially designed for use in connection with machines for constructing stiffened fabrics such as shown in my co-pending application filed the 17th day of May, 1921, Serial No. 470,471.

As hitherto constructed, fabric making machines of the kind above referred to have not provided for the automatic cutting of the fabric after it has progressed therethrough, the cutting having been done by hand either after the fabric has passed from the machine or just as it is leaving the same. Such cutting requires the service of an attendant constantly at the rear end of the machine for the purpose and the present invention has been designed to avoid this expense.

It is desirable as the fabric progresses through the machine that at predetermined intervals the knife should descend upon it and sever it. In order to accomplish this successfully, that is to say, without buckling of the traveling fabric, it is necessary that the blade should not only descend to cut, but also should simultaneously move with and in the direction of the fabric while in the act of cutting; in this way any dislocation of the fabric upon the machine is obviated and any buckling of it is entirely avoided.

With these and other objects in view which may be incident to my improvements, the invention consists in the parts and combinations to be hereinafter set forth and claimed, with the understanding that the several necessary elements comprising my invention, may be varied in construction, proportions and arrangement, without departing from the spirit and scope of the appended claims.

In order to make my invention more clearly understood, I have shown in the accompanying drawings means for carrying the same into practical effect, without limiting the improvements in their useful applications to the particular constructions, which for the purpose of explanation, have been made the subject of illustration.

In the drawings:

Figure 1 is a side elevation of the rear end of a fabric making machine showing the fabric in the act of progressing towards and under the blade.

Fig. 2 is an end view of the machine looking towards the right hand end of Fig. 1.

Fig. 3 is a plan view of the machine.

Fig. 4 is a plan view of the mechanism for reversing the worm and the carriage carried thereby.

Fig. 5 is an enlarged detail view of part of the structure shown in Fig. 4.

Fig. 6 is a detail side elevation of part of the structure shown in Fig. 4.

Fig. 7 is a detail view partly in section, showing the construction of the spring roller support.

The numeral 1 refers to the main frame of the machine supported upon feet 2, and mounted in said frame as illustrated in Fig. 1, are a plurality of spring actuated supporting rollers 2′, each alike, over which the fabric manufactured by the machine passes. Each end of the lower rod 3 is mounted in an arm 4 extending inwardly from each of the parallel sides. Said shaft extends transversely of the frame and is provided with a sleeve 5, within which is a helical spring 6, fastened at 7 to the shaft 3, and fastened near its other end to the sleeve 5 as at 5′. On each end of the shaft is attached a vertical arm 8, the same being provided at its upper end with a stud shaft 9 extending within the ends of the upper roller 10, the sleeve being adapted freely to turn upon said stud shafts. Over the series of upper rollers 10 passes the fabric constituting the stiffened fabric, as it progresses towards the cutting blade.

The operation of this part of the mechanism is as follows: The springs semi-rigidly hold upright the vertical arms and support the fabric as it passes over, but when the carriage upon which the blade, to be presently described, moves against the supporting roller, the latter gives and descends in the arc of a circle as indicated in Fig. 1; im-

mediately the carriage passes the roller, the spiral spring within the lower roller immediately reassumes its former position bringing its side arms again into vertical position to support the fabric.

Mounted upon the side of the main frame of the machine, one on each side, are longitudinal frame bars 200, and located on the outer part of the near one is a rack bar 201, for a purpose presently to be described. On top of these bars slides an auxiliary frame or carriage consisting of cross and side pieces 202 (see Fig. 2) with a flooring thereon. Said frame has a depending arm 206 in the center of the cross bar which is interiorly screw threaded so as to cooperate with a worm shaft 207, the latter having a pinion 203, engaging with an intermeshing pinion 204, secured to the carriage actuating power shaft 205, supported in bearings 208 and 208′. Mounted upon the upper part of the carriage is the cut-off mechanism proper and the carriage travels back and forth by means of the depending arm 206 in which the worm shaft 207 revolves.

The carriage is provided on each side with vertical standards 209 and 210, and a connecting cross bar 211 at the top. Attached to a supporting bar 212, is a blade 213, the bar 212 operating in guides 214 attached to the vertical standards (Fig. 2). Mounted on top of the standards in bearings 215 is a reciprocating bar 216′ and this bar at its center is provided with a pin 216 (see Fig. 3) adapted to travel in a groove 217 of a cam 21. Said rod is further provided near each end with additional pins 219, which fit loosely within the upper slotted ends of bell crank levers 220, the lower members 222 of which are pivotally secured to the bar 212, and support the blade 213. The action of the bell crank levers is such as to slidably operate the blade.

Forward of the knife and to one side of the carriage and on the side of the near bar 200 to the left in Fig. 2 is a shaft carrying upper and lower clutch members 224 and 225. The upper end of the shaft is provided with a toothed pinion 226 adapted to intermesh with a pinion 227, the latter being mounted upon one end of a stud shaft 228, having a gear 229, adapted to intermesh with a larger gear wheel 230, on the cam shaft 230′. The cam 218 on this shaft engages the pin 216 and gives the bar 216′ a reciprocating movement.

Mounted upon the carriage is a bar 231 secured to the machine and extending upwardly to and forming part of the support for the bearing for the shaft carrying the cam 218 (Fig. 1). Almost midway of the distance is a laterally extending arm 231′ upon which are mounted bell-crank levers 232 and 233. The bell-crank lever 232 is provided with a plunger 234 fitting into a dash pot 235 and surrounded by a spring 236. The lower end of the plunger extends through the lower end of the dash pot as at 237 and fits into slots 238 upon the arcuate bar 239.

The other bell-crank lever 233, is pivoted at 240. The bar 231′ upon which the arcuate bar is mounted extends to the left beyond the lower end of the arc and is provided with a spring 242 whose lower end extends to the lower arm of the bell-crank 233. The bar 239 is pivoted at 243 and that portion extending to the right of the pivotal point is provided at its end with a semi-circular arm 245 which extends partially around and below the boss 246, on the upper member of the clutch.

The two bell-cranks 232 and 233 at their outer ends are united by an operating lever 246′ by the actuation of which they are simultaneously operated, as follows: When downward pressure is applied to the lever 246′ the upper bell-crank 232 withdraws the plunger from the dash-pot 235 and enables it to be placed in the upper notch 238 in the arcuate bar 239. At the same time the bell crank 233 pushes the semi-circular end 245 of the arm 238 against the enlarged portion of the boss 246 on the upper clutch member and lifts the upper member out of engagement with the lower member, and as a consequence thereof the operating mechanism above the lower clutch member ceases to function. When, however, a reverse movement is given to the operating lever 246′, the reverse action takes place, the end 245 of the arm 244 is withdrawn from below the boss 246 and the upper member is allowed to descend into engagement with the lower member, the two operate as a unit and motion is imparted to the several intermeshing gears, above the clutch shaft.

The operation of the cut-off mechanism is as follows: Motion being imparted to the worm shaft by pinion 204 operated from any suitable source, the carriage 202 with its mechanism moves back and forth along the track 200′, the length of the rack bar 201, there being an automatic and reversible clutch mechanism to be hereinafter described, with which the right hand end of the shaft 205 coacts. At the same time the pinion 250 on the lower end of the clutch shaft 225′ engages the teeth upon the rack bar 201 and the members of the clutch being in engagement, the shaft revolves as the pinion travels over the rack and rotates the pinion 226 on the upper member of the clutch and through the intermediate intermeshing gears, heretofore described, operates the cam.

The movement of the cam operates the projecting pin 216 within the groove 217 and the latter operates the rock bar 216′ which in turn operates the bell crank levers

220 which impart to the knife the desired sliding action as it descends upon the fabric beneath.

It is to be noted that the travel of the carriage and its cutting mechanism is synchronous with the travel of the fabric upon the main machine frame, so that while the blade is in the act of cutting the fabric, it is also traveling with it and at the same rate of speed; in this way any buckling of the fabric against the blade which might occur, were the knife stationarily mounted, is entirely avoided.

Referring to Fig. 4 the numeral 301 represents a power operated shaft from which power is supplied to a small sprocket wheel 302 rigidly mounted upon the shaft 301 between the collars 303 and 303'. From said wheel 302 is a sprocket chain 304 extending over a larger sprocket wheel 305 on a stud shaft 306. The shaft 306 is mounted in bearings 307 and 308 and carries a cam wheel 309 the external periphery of which is divided into two equal parts. On one part is a lug 311 as clearly seen in Fig. 4 and on the other part is a similar lug 312 and the curved surfaces of the two lugs are oppositely disposed one to the other upon the periphery.

Adjacent to the cam wheel and projecting at right angles thereto is a pin 313 rigidly attached to a collar 313' mounted upon the shaft 314 to reciprocate in bearings 315 and 315' attached to a suitable frame 316. The purpose of the great difference in size between the small sprocket wheel 302 and the large sprocket wheel 305 is to effect a substantial reduction of speed between the shaft 301 and the stud shaft 306, in order that the cam 309 may revolve slowly. Above said shaft and mounted in bearings 317 and 317' are two sleeves 318 and 318' each partially screw threaded as seen at 319 and 320 for the reception of adjusting nuts 322 and 323. Within the sleeves 318 and 318' is mounted for horizontal reciprocation a smaller shaft 321 upon which are mounted collars 324 and 325. Mounted on the shaft 321 and bearing at one end against the collar 324 on said shaft and at the other end against the adjusting nut 323 on the sleeve 318' is a coiled spring 326 and mounted in a similar manner between the collar 325 and the adjusting nut 322 is a coiled spring 326'.

Referring to Figs. 4 and 5 it will be observed that when the curved lug 311 contacts with the projecting pin 313 the curved surface of said lug will slide on the pin 313 and move the shaft 321 downwardly against the tension of the spring 326' and when the lug 311 has passed the pin 313 the latter will be returned by the spring 326' to its normal or neutral position as shown in Fig. 4. When the lug 312 on the slowly revolving cam 309 contacts with the pin 313 after its return to neutral, the oppositely curved surface of said lug 312 will force the pin and shaft 321 in an opposite or upward direction as seen in the drawings against the tension of the spring 326, which spring will return the pin 313 to its neutral position as soon as it ceases to contact with it.

The upper reciprocating shaft 321 extends beyond the bearing 317 and has a pin and slot connection with the rod 328, the other end of which is pivoted to a bell crank lever at 329. Said lever is mounted for horizontal rotation on a suitable support 331. It may be observed that the lever and support are each webbed as at 332 and 333 to insure strength and mounted on the other end of the support 331 is a sleeve 334. The lower end of said bell crank lever is pivotally connected to a short rod 335 which has a pin and slot connection at 336 with a rod 337 mounted to reciprocate within a sleeve 334, the other end of the rod 337 is secured in an ear member 338. A connecting rod 339 is pivotally mounted between the ears of the member 338 and is inclined upwardly and is similarly connected with the ears of a member 340. This latter member 340 is provided with a set screw 341 to adjustably locate it on a shaft 342 mounted for longitudinal reciprocation in bearings 343 and 343' extending horizontally from the frame of the machine. The outer end of the shaft 342 is pivotally mounted at 344 to a short connecting rod 345, one end of which is pivotally mounted at 346 to one arm of a bell crank lever 347. The bell crank lever is preferably mounted for horizontal rotation in a bearing 348 extending from the machine frame. The other arm of said bell crank lever is pivotally mounted at 349 to a sleeve 350 fixed to the shaft 205. The lower end of the shaft 205 is provided with a gear 352 forming a part of any desired transmission system whereby the longitudinal reciprocation of the shaft 205 and the gear 352 will result in a reversal in rotation of the pinion 204 meshing with the pinion 203 on one end of the worm 207 extending longitudinally of the machine bed and through the screw threaded depending arm 206 of the reciprocating carriage 202. The transmission system referred to is shown as consisting of the usual housing 357, counter-shaft 358 and gears 359 mounted to slide on splines 360, but as the transmission system forms no part of my invention it is not necessary to further describe the same. The longitudinal movement of the reciprocating shaft 342 is limited by means of stops 361 and 361', one to limit the forward movement and the other to limit the backward movement of the shaft 342. The stops may be adjusted in any

desired position on the shaft 342 and are arranged to contact with projecting lugs 362 secured to the frame.

The operation of the mechanism is as below, assuming the carriage to be at the extreme forward position and ready to be returned to its rear-most position over the traveling fabric. The reversal of the worm 207 is effected in the following manner. The lug 311 on the slowly rotating cam 309 contacts with the pin 313, and the shaft 321 is forced downwardly, rocking the bell crank lever 329 which through the heretofore described connections slides the reciprocating shaft 342 forward. This motion is transmitted by the bell crank 347 in such a manner as to slide downwardly the shaft 205 which through the consequent interchange of mesh of the hereinbefore described transmission gears results in the reversing of the pinion 204 and worm 207. It will be understood that the rotation of gearing between the shafts 301 and 306 is designed to allow the carriage to complete its forward travel by the time the curved lug 312 of the cam 309 is ready to contact with the pin 313, at which time the pinion 204 is once more reversed by the reversing operation of the sliding connection as will be readily understood.

It will be noted that the shaft 205 is constantly being rotated in one direction from any suitable source of power (not shown) so that the worm 207 will be revolved in opposite directions alternately according to the position of the reversible clutch mechanism above described.

While I have shown and described the preferred embodiment of my invention, I wish it to be understood that I do not confine myself to the precise details of construction herein set forth, by way of illustration, as it is apparent that many modifications and variations may be made therein, by those skilled in the art, without departing from the spirit of the invention, or exceeding the scope of the appended claims.

I claim as my invention:

1. A device of the character described, comprising a main frame, means to progress a fabric over the same, a carriage adapted to travel over the main frame, a cutting blade mounted upon said carriage, means to so actuate the carriage that it will travel synchronously with the fabric and cooperate to drive the cutting blade, and manual means to control the action of the cutting blade.

2. In a device of the character described, the combination with the main frame, means to progress a fabric over the same, a carriage adapted to travel over the main frame, a cutting blade mounted upon the carriage, and means to so actuate the carriage that it will travel synchronously with the fabric, will automatically reverse itself at a predetermined time will cooperate to drive the cutting blade and manual means to control the cutting blade.

3. In a device of the character described, the combination with the main frame, means to yieldingly support a fabric, means to progress said fabric over the frame, a carriage adapted to travel over the main frame and a cutting blade mounted upon the carriage, of means to so actuate the carriage that it will travel synchronously with the progressing fabric, will reverse itself at a predetermined time and other means to control the cutting blade.

4. In a device of the character described, the combination with the main frame, means to yieldingly support the fabric, means to progress the fabric over the main frame, a carriage adapted to travel over the main frame and a cutting blade mounted upon the carriage, of means to so actuate the carriage that it will travel synchronously with the progressing fabric, will automatically reverse itself at a predetermined time, and manual means to control the cutting blade.

5. In a device of the character described, the combination with the main frame, means to progress the fabric over the same, a rack bar on the main frame, a carriage adapted to travel over the main frame and means to so actuate it that it will travel synchronously with the progressing fabric and reverse itself at a predetermned time, of a cutting blade mounted on the carriage, a shaft provided with a pinion at one end to engage the rack bar and connected at the other end through an intermediate means with the cutting blade.

6. In a device of the character described, the combination with the main frame, means to yieldingly support the fabric, means to progress the fabric over the same, a rack bar on the main frame, a carriage adapted to travel on the main frame and means to so actuate the carriage that it will travel synchronously with the progressing fabric and reverse itself at a predetermined time, of a cutting blade mounted on the carriage, a shaft provided with a pinion at one end to engage the rack bar and connected at other end through intermediate means with the cutting blade.

7. In a device of the character described, the combination with a main frame, means to progress a fabric over the same, a rack bar on the main frame, a carriage on said frame and means to so actuate the carriage that it will travel synchronously with the progressing fabric and reverse itself at a predetermined time, a cutting blade mounted on the carriage, a shaft provided with a pinion at one end to engage the rack bar and connected through intermediate means with the cutting blade, of clutch members

upon the shaft and means to engage and disengage said members whereby the cutting blade may be thrown into and out of operation as desired.

8. In a device of the character described, the combination with the main frame, means to progress a fabric over the same, a rack bar on the main frame, a carriage adapted to travel on the main frame and means to so actuate the carriage that it will travel synchronously with the progressing fabric and reverse itself at a predetermined time, a cutting blade mounted on the carriage, a shaft adapted at one end to engage the rack bar and connected at the other end through intermediate means with the cutting blade, of clutch members upon the shaft and manual means to engage and disengage said members whereby the cutting blade may be thrown into or out of operation as desired.

9. In a device of the character described, the combination with the main frame, means to progress a fabric over the same, a carriage adapted to travel over the main frame, means to so actuate the carriage that it will travel synchronously with the fabric, a cutting blade mounted in vertical standards upon the carriage and means to so actuate the carriage that it will travel synchronously with the progressing fabric and reverse itself at a predetermined time, of other means to operate the cutting blade whereby the fabric may be cut into any length desired.

10. In a device of the character described, the combination with the main frame, means to progress a fabric over the same, a carriage adapted to travel over the main frame, a cutting blade mounted in standards on the carriage and means to so actuate the carriage that it will travel synchronously with the progressing fabric and reverse itself at a predetermined time, of a blade operating shaft, a cam mounted thereon and intermediate means between the cam and the blade whereby upon the operation of the shaft a sliding motion is given to the blade.

11. In a device of the character described, the combination with the main frame, means to progress a fabric over the same, a worm shaft mounted in the main frame, a carriage adapted to travel over the main frame, an arm on the carriage adapted to engage with the worm to reciprocate the carriage so that it will travel synchronously with the progressing fabric and reverse itself at a predetermined time, of a cutting blade mounted upon the carriage and means to operate the blade whereby the fabric may be cut into any length desired.

12. In a device of the character described, the combination with the frame, means to progress the fabric over the same, a worm shaft mounted in the main frame, between the sides thereof, a carriage on the main frame adapted to travel over the same, a depending arm upon the carriage adapted to engage with the worm to reciprocate the carriage so that it will travel synchronously with the progressing fabric and reverse it at a predetermined time, of a cutting blade mounted upon the carriage and means to slidably operate the blade whereby the fabric may be cut into any length desired without any buckling thereof.

13. In a device of the character described, the combination with the main frame, means to progress a fabric over the same, a rack bar on said frame, a worm shaft mounted between the sides thereof, a carriage adapted to travel over the main frame, a depending arm on the carriage adapted to engage with the worm to reciprocate the carriage so that it will travel synchronously with the progressing fabric and reverse itself at a predetermined time, of a cutting blade mounted upon the carriage, a shaft adapted at one end to engage the rack bar, and connected at the other end with means to slidably operate the blade whereby the fabric may be cut into any length desired without buckling thereof.

14. In a device of the character described, the combination with the main frame, means to progress a fabric over the same, a rack bar on said frame, a worm-shaft mounted in the main frame intermediate the sides thereof, a carriage adapted to travel over the main frame, a depending arm on the carriage adapted to engage with the worm and reciprocate the carriage so that it will travel synchronously with the progressing fabric and reserve at a predetermined time, of a cutting blade mounted on the carriage, a shaft connected at one end through intermediate means with the cutting blade and at the other with a pinion adapted to engage the rack bar and operate the cutting blade as the carriage reciprocates, clutch members on said shaft and means to engage and disengage said clutch members whereby the cutting blade may be operated as desired.

15. In a device of the character described, the combination with the main frame, means to progress a fabric over the same, a carriage adapted to travel upon said frame, a shaft mounted in the carriage, a cam upon said shaft, a reciprocating shaft located adjacent thereto, a cutting blade adapted to be engaged and automatically moved in opposite directions by means of the cam and reciprocating shaft, of a carriage actuating power shaft located upon the main frame, a gear-shifting transmission system thereon and means connected therewith whereby the carriage automatically reverses its longitudinal movement upon the main frame.

16. In a device of the character described, the combination with the main frame, means

to progress a fabric over the same, a carriage adapted to travel thereon and means to so actuate the carriage that it will travel synchronously with the fabric, of a power-operated shaft, a cam driven thereby, a reciprocating shaft adapted to be automatically moved in opposite directions by the cam, and intermediate mechanism between the power-operated shaft and the carriage power actuating shaft to automatically reverse the longitudinal movement of the carriage.

17. In a device of the character described, the combination with the main frame, means to progress a fabric over the same, a carriage adapted to travel over the main frame, a cutting blade mounted upon said carriage, means to so actuate the carriage that it will travel synchronously with the fabric and co-operate to drive the cutting blade, and manual means to control the action of said blade, of a power-operated shaft, a cam driven thereby, a reciprocating shaft adapted to be automatically moved in opposite directions by the cam and intermediate mechanism between the power-actuating shaft and the carriage actuating power shaft to automatically reverse the longitudinal movement of the carriage.

18. In a device of the character described, the combination with the main frame, means to progress a fabric over the same, a carriage adapted to travel over the main frame, a cutting blade mounted upon said carriage, means to so actuate the carriage that it will travel synchronously with the fabric and co-operate to drive the cutting blade, of a power-operated shaft, a cam driven thereby, lugs oppositely disposed on the periphery of the cam, a reciprocating shaft adapted to be automatically moved in opposite directions by the cam and intermediate mechanism between the power-operated shaft and the carriage power-actuating shaft to automatically reverse the longitudinal movement of the carriage.

19. In a device of the character described, the combination with the main frame, means to progress a fabric over the same, a carriage adapted to travel thereon, and means to so actuate the carriage that it will travel synchronously with the fabric, of a power-actuated shaft, a cam driven thereby, oppositely disposed lugs upon the periphery of the cam, a finger projecting therefrom whose free end lies between the spring-pressed collars of a coacting shaft forming part of a reversal mechanism whereby when one lug ceases to operate against the finger, the pressure of the spring returns the reciprocating bar to neutral position when it is engaged by the other lug and movement of the carriage upon the main frame is automatically reversed.

In testimony whereof I affix my signature.

LEWIS K. DAVIS.