June 11, 1946. O. F. GOEPFERT 2,402,037

FEED CONTROL DEVICE

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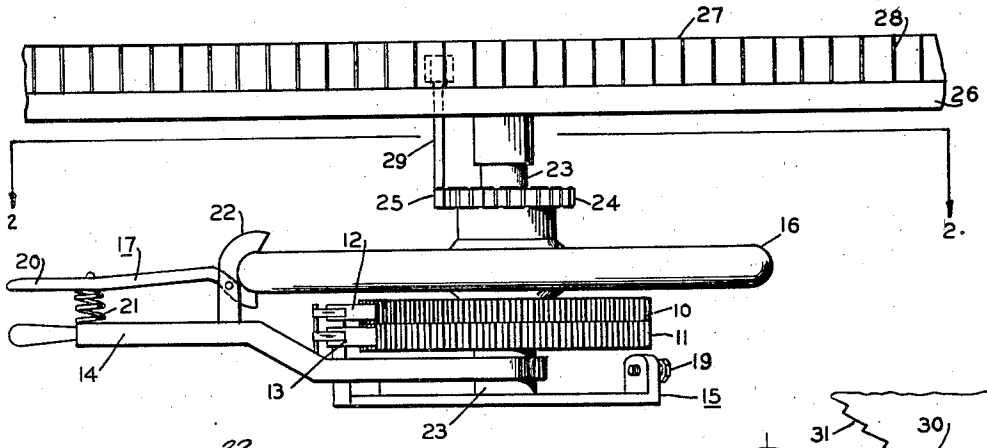


FIG. 1

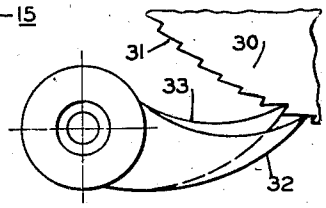


FIG. 3

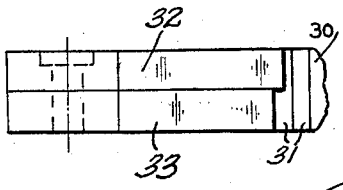


FIG. 4

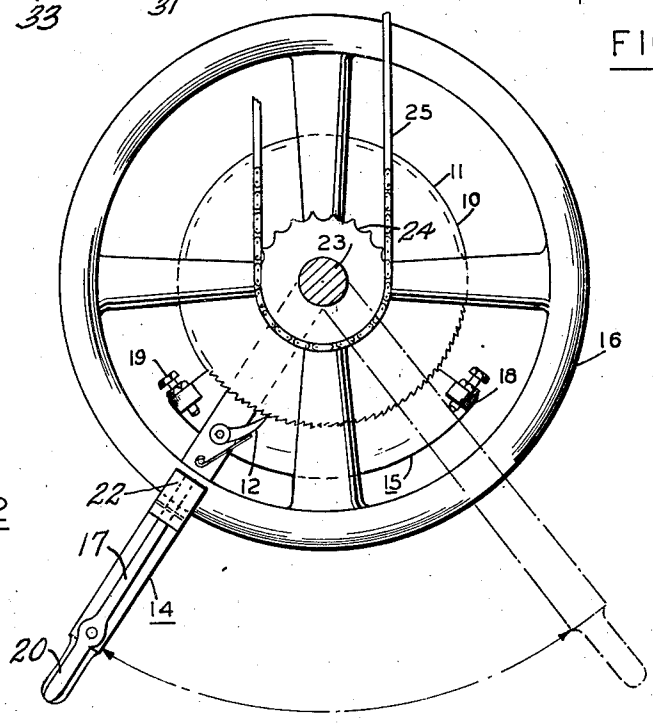


FIG. 2

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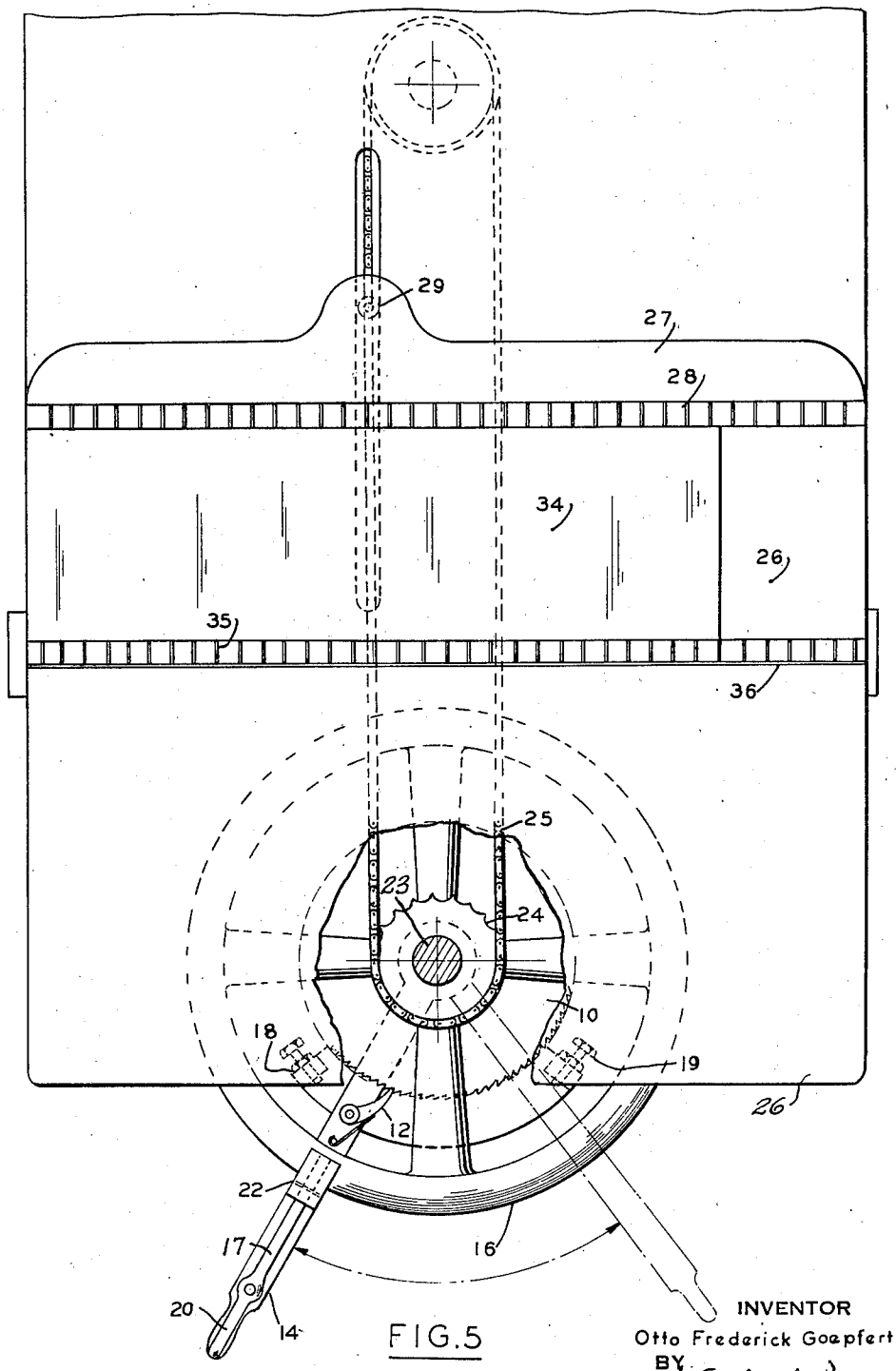


FIG.5

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UNITED STATES PATENT OFFICE

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FEED CONTROL DEVICE

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Application January 21, 1942, Serial No. 427,615

3 Claims. (Cl. 271—2.1)

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My invention relates to cutting machines and more particularly to a feed control device for use on a paper cutting machine.

In the cutting of certain high quality papers like cigarette paper, the cut pieces must be of uniform size and this involves accurate feeding of the paper stock to the cutting knife. The feeding device used for this purpose should be so regulated and controlled that exactly the same width, or length, of paper will be brought under the guillotine or other type of knife.

Both automatic and manually operated feeders, or spacers as they are frequently called, have been proposed heretofore. The automatically operated feeder is substantially accurate but has a time delay in the operation that seriously limits production of the cut paper. Furthermore, the machine uses complicated electrical control mechanisms and is very expensive. The manually controlled devices proposed prior to my invention have possessed the disadvantage of inaccuracy; that is, not always feeding exactly the same amount or dimension of paper to the cutter.

In accordance with my invention I have discovered and used very satisfactorily on commercial size paper cutting machines a feeding or spacing device that overcomes the objections to the prior devices and meets all the requirements for accuracy and speed of operation. This device is manually operated but requires no special skill and no visual attention of the operator. It can be very rapidly manipulated at a rate substantially faster than the electrically controlled device, and nevertheless effects uniform accurate feed of the paper to the cutting knife.

The feed control device of my invention comprises generally a ratchet and pawl assembly adapted to move arcuately a predetermined fixed distance and thereby advance a paper feeder carriage movably connected to the assembly. A single ratchet and pawl or a plurality of the same may be used. As the carriage advances the stock of paper is fed progressively toward the cutting knife which in operation cuts the predetermined size of paper from the advancing stock sheet or sheets; the size being accurately determined and controlled by the exact distance of movement of the ratchet mechanism.

Further details of construction and mode of operation of my invention will be understood from the following more specific description taken in conjunction with the accompanying drawings that illustrate a non-limiting embodiment of the invention and in which:

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Fig. 1 is an end view of the feed control device and associated parts;

Fig. 2 is a plan view of the device and associated sprocket;

Fig. 3 is a plan view of a modified arrangement of the ratchet and pawl assembly using one ratchet and two pawls;

Fig. 4 is a side view of the same; and

Fig. 5 is a plan view of the cutting machine showing the feed control device in operative position.

Referring now to the several figures and generally in their order of occurrence, my feed control device in the specific arrangement shown, comprises two ratchet wheels 10 and 11 mounted in fixed superimposed relationship; two ratchet pawls 12 and 13, a control handle 14, a gauging segment 15, a hand wheel 16 and a brake therefor 17. The gauging segment 15 carries two stop blocks 18 with adjustable screws 19 that limit the distance of travel of the control handle 14. The handwheel brake 17 has a handle 20 and spring 21 so arranged that when the handle is depressed the clamp 22 will grip the wheel 16.

As indicated in Fig. 1, the above identified feed control assembly is horizontally mounted on a vertically extending axis or shaft 23. Also mounted thereon is a sprocket 24 which carries a chain 25. The ratchet wheels, hand wheel, and sprocket are fixed to the shaft and rotate with it. The control handle and associated pawls are mounted so as to rotate around the shaft. Located above the sprocket 24 is the cutting table 26 and movable thereon is the paper feed carriage 27, which is segmented into a number of spaced partitions shown at 28.

The feed control mechanism is connected to the movable carriage 27 through the intermediary of the sprocket 24 and chain 25 and a member 29 that connects the chain with the carriage.

The two ratchet wheels 10 and 11 have, as indicated, a large number of fine teeth or flutings for engaging the ratchet pawls 12 and 13, respectively. These teeth are cut or otherwise formed as closely together as is practical to do so. In one specific but non-limiting example, this involves a distance of approximately 2 millimeters between the adjacent teeth. By using two ratchet wheels and arranging them so that the teeth of one wheel are staggered with respect to the teeth on the other wheel, the effective distance between adjacent teeth is reduced in half; that is, to a distance of about one millimeter. In this manner the fineness of adjustment of the feed control or spacer is doubled and the paper can

therefore be cut to more accurate size; in this instance to any desired millimeter measurement.

Instead of using two ratchet wheels pinned together as a unit, a single wheel having two sets of teeth in spaced staggered relationship may be employed. Such an arrangement will be quite apparent from the illustration of the two combined wheels in Fig. 1.

Any desired coarser spacing of the teeth on the ratchet wheel or wheels may be employed and where fine measurements are not required only one set of ratchet teeth and one pawl may be used if desired.

In the alternative arrangement illustrated in Figs. 3 and 4, I employ a single ratchet wheel 30 having a series of teeth 31; and two pawls 32 and 33. The pawl 32 is slightly longer than the pawl 33. In a specific example this difference in length might be one millimeter, and if the teeth 31 are spaced apart two millimeters, the respective pawls will engage alternately with each one millimeter movement of the ratchet. This spacing between ratchet teeth and difference in length of the pawls may be varied to lesser or greater dimensions as desired. Likewise, any desired number of pawls greater than the two illustrated may be employed for obtaining fine adjustments.

Referring to the plan view of the cutter and feed control mechanism shown in Fig. 5, it will be noted that the paper or other stock to be cut, as shown at 34, is supported by the cutting table 26. The stock may be, for example, paper, fabric, leather, plastics or wood, and either single or multiple plies of stock may be cut at a time. Extending across the width of this table is the sectioned portion 28 of the movable carriage 27. A similarly sectioned stationary member 35 is located transversely across the cutting table 26 and closely adjacent the cutting knife 36. The partitions in the member 35 are located in staggered relationship with respect to the corresponding partitions 28 in the movable carriage. This permits these respective sectioned members to mesh at the end of the limit of travel of the carriage and thereby present to the knife 36 the last or end portion of the paper stock 34, which is progressively advanced over the length of the cutting table during operation of the machine.

The operation of the cutting machine generally and the feed control device of my invention will be understood from the following description. The predetermined size of the pieces or blocks of paper or other material to be cut determines the spacing between the two stops 18, or more specifically between the two adjustable screws 19 carried by these stops. If, for example, it is desired to cut blocks of cigarette paper say 72 millimeters in length, the two stops 18 are set so that when the control handle 14 is moved from the stop on the left side to the stop on the right side, the paper stock will be advanced toward the cutting knife exactly 72 millimeters in length. In practice, I have found that this machine operates with extreme accuracy in this respect, and variations in the dimensions of the cut paper do not normally exceed ¼ of a millimeter.

By observing the illustration in Fig. 5 it will be understood that when the operator moves the control handle 14 the arcuate distance between the two blocks or stops as above described, the two ratchet wheels 10 and 11 will be moved an equivalent distance by virtue of the spring contact of the pawls 12 and 13 therewith. The sprocket 24, which is mounted on the same shaft 23, will rotate an equivalent distance and this in

turn will cause the chain 25, which circles this sprocket, to move an equivalent distance. Now since this chain is bolted or otherwise firmly connected to the movable carriage 27, by means of a suitable connecting member such as shown at 29, the carriage 27 will likewise move forward an equivalent distance. This means that the paper stock, which abuts against the partitions 28 of the carriage 27, will be advanced toward the cutting knife 36 the same exact distance, e. g. 72 millimeters.

After the paper is advanced, the cutting knife 36 is operated either by hand or foot pedal or by other conventional means and cuts off a strip of the paper, the longer dimension of which is determined by the width of the cutting table 26 and the narrower dimension of which is determined by the distance that the carriage moves with each complete arcuate movement of the control handle 14. In the specific but non-limiting example given this distance is 72 millimeters but any other desired distance or size may be used.

Referring to the control handle 14 and the brake control handle 20, it will be understood from the foregoing that when the operator grasps these two handles and depresses the handle 20 the locking member 22 will firmly grip the hand wheel 16. Now holding the two handles in this position the operator moves the assembly toward the right until the control handle 14 butts the right hand block 18 and during this operation the hand wheel 16 has been rotated or moved in an arcuate manner the same distance as the handle 14.

When the control handle has been moved through the predetermined arcuate distance the operator releases or lessens his grasp upon the brake handle 20 so as to disengage the locking member 22 from the hand wheel 16 and then moves the control handle assembly in the opposite direction; that is, back to the starting point. A specific purpose which the locking member 22 performs in this operation is that it prevents the hand wheel 16 from overriding, that is, rotating beyond the desired distance which would normally otherwise take place because of the momentum and weight of this wheel once it is put into motion. Overriding would cause the paper to be fed beyond the desired distance and would therefore cause inaccuracies in the cut paper.

The hand wheel may purposely be used when desired to move the carriage and feed the paper for cutting by sight or without exact measurement. It is also useful in returning the carriage to the starting position after the cutting operation has been completed on the paper stock.

With relatively short practice an operator will be able to manipulate the above described mechanism at a rapid rate and since the accuracy of the cutting is automatically taken care of by the predetermined and fixed distances above described he need give no thought to this requirement. Therefore, his operation of the machine after some practice becomes practically mechanical and unusually high speed is obtained.

Various modifications and changes may be made in the mechanisms and procedures described above without departing from the scope of my invention, some of the novel features of which are defined in the appended claims.

I claim:

1. A manually operated feed control device comprising as a unit in a machine of the character described, a rotatable shaft, a circular, pe-

ripherally and finely fluted member fixedly mounted thereon, a pawl held in peripheral contact with said fluted member, a gauging segment for said lever, adjustable means at each end of said segment for limiting movement of the lever in opposite directions along said segment, a hand wheel fixedly mounted on said shaft, a brake carried by said lever and engageable with said hand wheel, and manually manipulable means on said lever for setting the brake in gripping engagement with said hand wheel at the will of an operator, the hand wheel being normally rotatable free of the brake.

2. A manually operated unitary feed control device for a machine of the character described, comprising a rotatable shaft having an operative connection with the feeder element of the machine whereby to translate rotation of the shaft into forward and backward movement of the feeder element, ratchet and pawl driving means for said shaft, said means including an oscillatory operating lever, manually operated rotary means on said shaft for rotating the shaft independently of said ratchet and pawl means, correlated brake means on said oscillatory operating lever for establishing a fixed connection between the lever and said rotary shaft-rotating means, and means on said oscillatory operating lever of the ratchet and pawl means, manually operated and controlled by and at the will of the operator, for engaging the brake means with said manually operated shaft-rotating means whereby to effect actuation of the said rotary shaft-rotating means and oscillatory operating lever the

one by the other, and for releasing the brake means from engagement with the rotary shaft-rotating means to permit actuation of the oscillatory operating lever and of said rotary shaft-rotating means independently of each other.

3. Manually operated means for controlling and actuating a material feeding element in a paper cutting machine and the like, comprising a rotatable shaft having a driving connection with the material feeding element of the machine whereby to translate rotation of the shaft into forward and backward movement of said element, a handwheel fixed on said shaft to rotate therewith for rotating the shaft to move the material feeding element either forward or backward by said handwheel, ratchet and pawl means for rotating said shaft in one direction only to move said material feeding element forward, an oscillatory handle lever operating independently of said hand wheel for actuating said ratchet and pawl means to effect the forward movement of the material feeding element, opposed spaced stops each separately adjustable for limiting the movement of said oscillatory handle lever between them, a brake carried by said handle lever and engageable with said hand wheel, and manually operated means on said handle lever normally holding said brake out of gripping engagement with said handwheel but actuatable at the will of the operator for causing the brake to grip said handwheel and hold the wheel in releasably engaged relation to move with said handle lever.

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