Aug. 8, 1939. A. M. COLEMAN ET AL 2,168,394

MACHINE FOR OPENING ENVELOPES

Filed Feb. 9, 1938 3 Sheets-Sheet 1

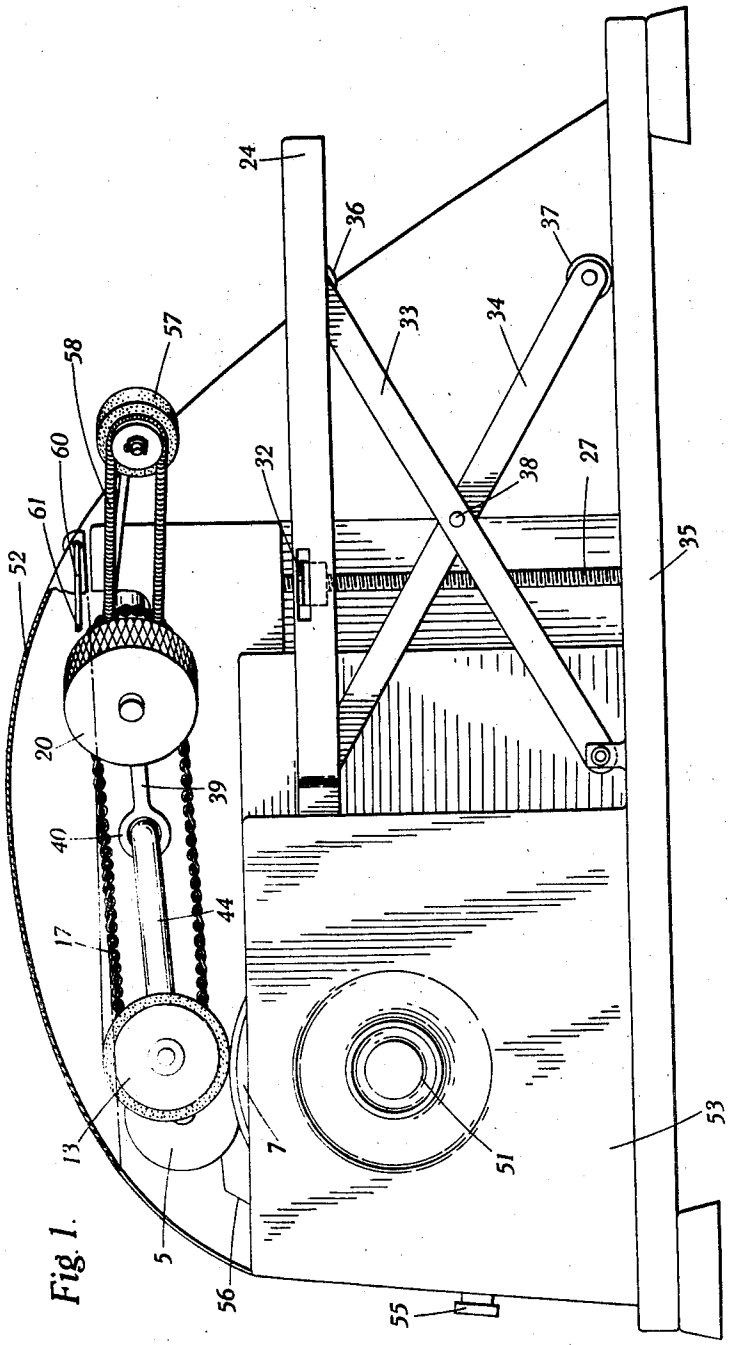


Fig. 1.

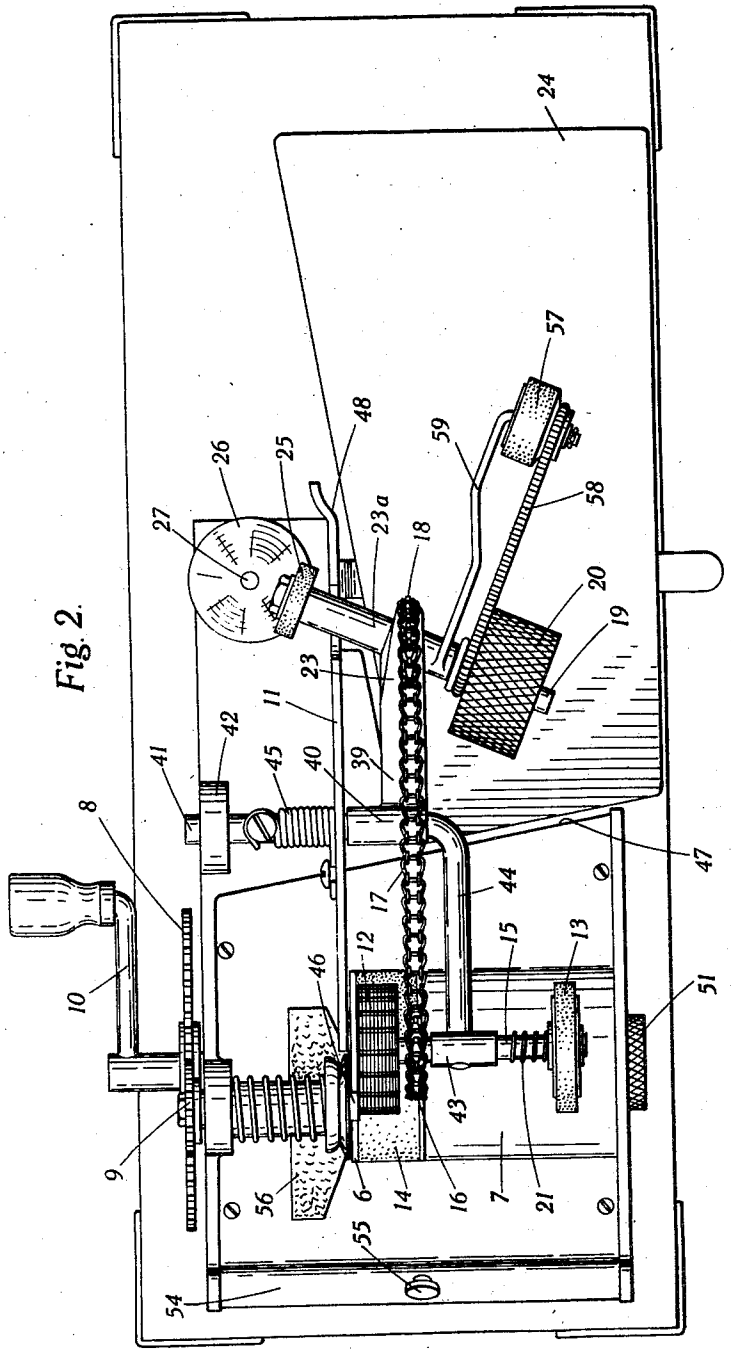
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Fig. 2.



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Fig. 3.

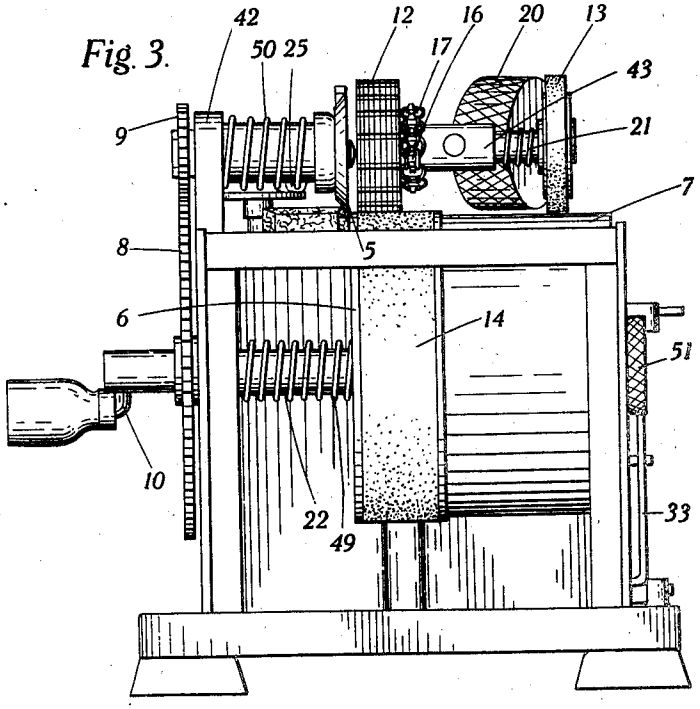
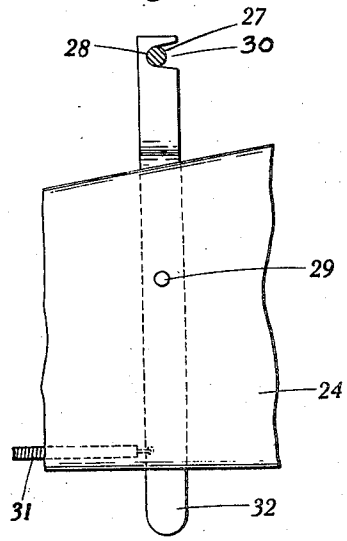


Fig. 4.



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MACHINE FOR OPENING ENVELOPES

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11 Claims. (Cl. 164—61)

This invention is concerned with a machine which, although principally designed for opening envelopes, can also be used for other cutting operations in the nature of edge-trimming.

Machines for cutting an edge of an envelope have previously been proposed, in which the envelopes were fed in by a roller or belt until the edge to be cut bore against a guide-plate serving to locate the said edge properly with respect to a cutter, the latter being usually in the form of two rotating blade members, while the roller or belt was inclined, the better to feed the envelopes in towards the guide along which they passed to the cutters. In one such machine it was proposed to stack the envelopes in a pile on a bed-plate of the machine substantially level with the cutters and stationary with respect thereto, the envelopes being proposed to be fed singly from the bottom of a pack through a gate (which kept back the others of the pack) to the cutters by a travelling belt which took the envelopes as each one in its turn came into contact with the belt. A machine of that kind might have many disadvantages, for if a pack or pile of envelopes happened to be deep and fairly heavy, the belt would tend to feed forward not only the lowermost envelope but also one or more immediately above it; now, if the envelopes were all of one thickness and the gate were properly set, the envelopes could pass through the gate only one at a time, but with envelopes of different thicknesses the gate was apt either to stop a thick envelope, or to let two or more very thin ones go through together and cause jamming at the cutters. Furthermore, the fact that the lowermost envelope of a pile was held between the supporting platform or the belt and the remainder of the pile might tend to put up an unnecessary restraining influence to the angular movement of the envelope for the time being fed and turned in towards the guide.

According to the present invention, a machine for performing an edge-trimming operation has means for feeding a pile of articles towards a feed roller adapted to select the uppermost article of the pile and bring the edge to be cut into contact with a guide member for locating the said edge with respect to a cutting element. In accordance with the usual practice, it will be preferred to use rotating blade members for the cutting element.

As the feed roller directly engages only the uppermost article of the pile, it will be appreciated that it is much easier for it to take off the top one and turn it inwards towards the guide than it is for a belt article to collect the lowermost member of the pile with the remainder of the pile bearing on it.

It may be added that feeding the uppermost article of the pile to the cutters has a distinct advantage in that the work may be seen immediately before it proceeds to the cutters; thus, if an incorrectly-addressed envelope, or one of a confidential nature, were inadvertently included with the general office mail, or if for any reason or irregularity it were desired to stop the article going through the machine, that end could be achieved, and for that reason it will generally be preferred to drive the machine by a manually-rotatable handle, although in some cases for opening large general office mails, an electric motor or other driving means may be provided.

In order that it may be clearly understood and more readily carried into effect, the invention is hereinafter described with reference to the accompanying diagrammatic drawings, of which:

Figure 1 is a side elevation of a machine according to the invention designed for cutting the edges of envelopes; it may be mentioned that ordinarily the mechanism will be entirely enclosed by a detachable cover, which in Figure 1 is shown broken away;

Figure 2 is a plan view corresponding to Figure 1 but in which the cover is entirely removed;

Figure 3 is an end elevation corresponding to Figures 1 and 2 but showing the end wall of the body removed to reveal the interior arrangement; while

Figure 4 is a fragmentary detail view illustrating the disconnectable drive for effecting rising and falling of the platform on which the envelopes to be opened can be stacked.

Referring now to the drawings, the cutter comprises two members one of which is the renewable circular wafer blade **5** and the other comprises a shearing edge **6** slightly overlapping the wafer blade. The shearing edge **6** conveniently is provided upon the inner edge of a supporting roller **7** upon which the envelopes rest while they are in the neighbourhood of the cutter. Rotation of the blade **5** and the shearing edge **6** is effected by means of gearing **8** and **9** of which the gear wheel **8** is associated with a hand lever **10**. The gear wheel **8** conveniently is coaxial with the supporting roller **7**, and it will be appreciated that the gear wheel **9** engages the wheel **8** and is driven thereby but in the reverse direction so that the blade **5** on the end of the spindle of the gear wheel **9** and the shearing edge **6** rotate in opposite directions. The effective cutting point

is of course the point of intersection of the two rotating cutting members 5 and 6 which project very slightly out from a guide plate 11.

Roller means are provided for delivering envelopes to the cutter. The roller 7 hereinbefore referred to cooperates with pressure rollers 12 and 13, of which 12 is metal and bears on a rubber-covered annulus 14 of the roller 7, while 13 is rubber-covered and bears on the plain metal of the roller 7. The pressure rollers 12 and 13 are driven by rotation of the supporting roller 7, either by direct contact therewith, or by engaging an envelope lying between the roller 7 and the said pressure rollers. Fast with the axle 15 interconnecting the pressure rollers 12 and 13 is a sprocket 16 which is engaged by a chain 17 leading to a sprocket 18 on the axle 19 of the rubber-covered roller 20, which is in fact the main feed roller. The main feed roller 20 is placed slantwise in relation to the guide plate 11 so that an envelope engaged by the said feed roller tends to be fed towards the guide-plate along which it can then move towards the cutter. When an envelope reaches the supporting roller 7 it is gripped between it and the pressure rollers 12 and 13, which continue to turn as the envelope is fed through, with the result that the main feed roller 20 is rotated continuously. It has been found desirable in order to keep the envelope tight up against the guide-plate 11 in the neighbourhood of the cutters 5 and 6 to mount the pressure roller 13, not fast upon the shaft 15 but rotatable thereon and restrained against rotation, as for example by means of a spring 21 tight on the axle 15, which spring is fixed to bearing 43. The roller 13 is in effect what may be termed a "lazy pressure roller", and it may be mentioned that the arrangement of the rollers 12 and 13 is important, for it is found that there is ordinarily a tendency for the edge of the envelope being cut to be fed away from the guide-plate 11, but the lazy pressure roller 13 overcomes that tendency.

It will be appreciated that the axle 15 of the pressure rollers and the axle 22 (Figure 3) of the supporting roller 7 are very nearly parallel and very nearly at right-angles to the guide-plate, whereas the main feed roller axle 19 is slantwise in relation to those members, and it is therefore necessary to provide some sort of universal joint in connection with the drive to the main feed roller. It may be mentioned that the axle 15 of the pressure rollers 12 and 13 is preferably very slightly out of the perpendicular with respect to the guide-plate 11, and out of parallelism with respect to the supporting roller axis 22, so that the roller 13 is somewhat in advance of the roller 12, with respect to the direction of feed, and there is again the tendency for the envelopes to be fed in towards the guide-plate 11. As a convenient, simple and cheap form of universal joint, it is preferred that the sprocket 18 shall have a central opening considerably larger than the axle 19 of the main feed roller so that the sprocket 18 can wobble on the axle 19, but in order to drive the shaft there is projecting inwards from the central opening of the sprocket wheel 18 a substantial peg engaging a keyway of the axle 19, the sprocket wheel 18 itself being guided in the housing 23 so as to be maintained in the same plane as the sprocket 16 on the axle 15 of the pressure roller. The housing 23 preferably will also include a hollow cross tube 23*a* for housing the axle 19 of the main feed roller 20. The machine is provided with a platform 24 upon which a pile of envelopes are intended to be placed for delivery to the cutters. The platform is driven so that it can rise slowly, keeping the uppermost envelope of the pile in contact with the main feed roller 20. As will be seen from Figure 2, the axle 19 of the main feed roller has fast on the inner end of it a friction-driving wheel 25 which bears upon the upper face of a friction-driven wheel 126 fast on a vertical shaft 27. The vertical shaft 27 is threaded and is engaged by a correspondingly threaded split eye 28 attached to the platform 24, and consequently as the threaded shaft 27 rotates the platform 24 will move vertically. The split eye 28 is provided on the end of a lever pivoted to the platform 24 about the point 29, and is quite open at one side, as indicated at 30, so that the split eye can be moved out of threaded engagement with the threaded rod 27 enabling the drive to the platform 24 to be disconnected for the platform to be made to rise and fall by hand. A light spring 31 will usually be provided to maintain the split eye 28 in engagement with the vertical threaded shaft 27 until pressure is applied to the projecting end 32 to disengage the split eye from the shaft. The platform 24, as shown in Figure 1, is supported upon toggle links 33 and 34. In order to minimise friction in the platform mounting, the toggle link 33 may be attached to the base 35 of the machine and will bear upon the underside of the platform 24 through the freely-rotatable roller 36. Similarly, the link 34 will have its upper end attached to the platform, and at its lower end will have the freely-rotatable roller 37 to bear on the upper surface of the base, the two links being pivotally interconnected substantially centrally at the point 38.

It is important that the rate of feeding the platform 24 up towards the main feed roller 20 shall not be so great that the main feed roller 20 puts any appreciable pressure upon the pile of envelopes on the platform 24, otherwise more than one envelope may tend to be delivered to the cutters. In the circumstances, therefore, the main feed roller assembly, which is comparatively light, is free to rise if more than very light upward pressure is exerted upon it. The main feed roller assembly is mounted on the bearing bracket 39, the apertured boss 40 of which is received on the transverse spindle 41, which spindle itself extends through an aperture in the guide-plate 11 and is supported at its outer end by the apertured upstanding lug 42. It is convenient to provide the split housing 23 hereinbefore referred to for locating the sprocket 18 on the outer end of the bracket 39. It will be appreciated that if a predetermined pressure, dependent upon the weight of the main feed roller assembly, is exceeded, the assembly will lift as a whole, with the result that the friction-driving roller 25 normally bearing upon the upper face of the friction drive wheel 26 will also lift and the drive to the shaft 27 will be broken, with the consequence that the platform 24 will cease to rise.

It will be convenient to mount the pressure rollers 12 and 13 in the bearing 43 on the end of the forward extension 44 of the spindle 41, the pressure being imparted to them by the spring 45, which has one end secured to the spindle and the other end secured to a fixed anchorage. If it is required to renew the wafer blade 5, access to an end nut 46 holding it on may be secured by lifting up the pressure rollers against the spring 45, whereafter the old blade 5 can be taken off and replaced by a new one. If desired, the spring 45 may be readily disconnectable

to enable the pressure roller assembly to be lifted freely.

When the envelopes are stacked on the platform **24**, they are preferably placed with their forward edges tight up against the fixed edge **47** and the edges which are to be severed against the corner **48** of the guide-plate **11** so that as the feed roller engages the uppermost envelope of the pile it turns its forward end in against the guide-plate and the envelope is kept tight up against the guide-plate in a proper position for cutting.

In order to provide for adjustment of the cutters, the supporting roller **7** will be mounted upon its spindle **22** so that it can be moved inwards against the pressure of the spring **49** towards the cutter **5**, which is itself pressed into engagement with the shearing edge **6** by the spring **50**. At the end of the spindle **22** remote from the handle **10**, there is provided the knurled adjusting member **51** which is threaded in the frame **53**, preferably in the hub of drum **7** and against a ball (not shown) which in turn engages the free end of spindle **22**. When member **51** is tightened up the pressure roller will move inwards. When the pressure roller is moved inwards the shearing edge **6** will bear against the cutter **5** and press that inwards also so that it will not project out so much from the guide plate **11**. If on the other hand a deeper cut is required, the nut **51** may be slackened off so that the roller **7** moves back under the influence of the spring **49** and the cutter **5** is pressed out, being kept in engagement with the shearing edge by the spring **50**.

The whole cutter mechanism, gearing, et cetera, will preferably be encased by a covering, indicated at **52**, Figure 1. The covering preferably will be removable and when in position will enclose all the movable parts except the platform **24** and its supports. Beneath the cutters there will be the hollow casing **53**, the front wall **54** of which can be removed by means of a latch associated with the knob **55**. The shavings will be delivered from the cutters through an opening in the top of the casing **53** to be collected therein, and adjacent the cutter **5** there will preferably be provided a felt pad **56** which can be kept somewhat moist with oil to prevent the cutter from becoming rusty.

The small jockey feed pulley **57** driven from the machine feed roller **20** by the flexible drive **58** may be provided in some cases in order that the feed may be more adequate to cope with a pile of somewhat irregular thickness, the pulley **57** being itself freely-rotatable on the stay **59** attached to any convenient fixed part of the machine.

60 is a gauge member which may be turned down so that its end **61** can be used as a guide to indicate the position into which the uppermost envelope of the pile is to be placed before it can be fed away by the feed roller **20**. Thus, when a pile of envelopes is placed on the platform **24**, the gauge can be turned down and the platform lifted until the uppermost envelope of the pile strikes against the gauge. The gauge can then be turned back to its original position and feeding of the envelopes from the pile will commence immediately the handle **10** is turned. The gauge may be spring-urged so that it will ordinarily assume the position shown in Figure 1.

It may be mentioned that the wafer blade **5** preferably is distorted so as to take a somewhat hollow ground formation, and to that end the blade is received upon a carrier which has a concave outer surface against which the blade **5** is made to bear as the adjusting nut **46** is tightened up.

What we claim is:

1. An edge-trimming machine including a work-supporting table having means for raising said table comprising an edge guide-plate, a cutting element projecting beyond said guide-plate, roller means above and spaced from said table for feeding work resting on said table toward said guide-plate, roller means for clampingly guiding work past said cutting element, and means for driving said roller means and said means for raising said table.

2. An edge-trimming machine including a work-supporting table having means for raising said table comprising an edge guide-plate, a cutting element located beyond said guide-plate, roller means above and adjustably spaced from said table for feeding work resting on said table toward said guide-plate, roller means for clampingly guiding work past said cutting element, and manual means for driving said roller means and said means for raising said table.

3. An edge-trimming machine including a work-supporting table having means for raising said table comprising an edge-guide-plate, a rotatable wafer blade cutting element located beyond said guide-plate, a shearing member cooperable with and movable in a sense opposite to that of said element, roller means above said work and engageable therewith for feeding said work from said table to said guide-plate, roller means for grippingly guiding said work past said element and shearing member, and means for driving said roller means, element, shearing member, and said means for raising said table.

4. An edge-trimming machine including a work-supporting table having means for raising said table comprising an edge guide-plate, a cutting element projecting beyond said plate, feeding means for transporting work from above said table to said guide-plate, pressure roller means adapted to grip said work between them for propelling and guiding said work past said element, means associated with one of said pressure roller means for positively driving said element and frictionally actuating the other of said pressure roller means, said feeding means being drivingly connected with said other of said roller means.

5. An edge-trimming machine including a work-supporting table having means for raising said table comprising an edge guide-plate, a cutting element projecting beyond said plate, means for feeding work from above said table toward said guide-plate, pressure roller means for propelling said work past said element, and means positively driving at least one of said pressure roller means and said element, said driving means actuating the other of said pressure roller means, said feeding means and said means for raising said table, said raising means including separable friction members for interrupting engagement thereof to prevent excessive rise of said table during a cutting operation.

6. An edge-trimming machine including a work-supporting table having means for raising said table comprising an edge guide-plate, a removable cutting element projecting beyond said plate, a roller spaced apart from and swingable over said table for engagement with a work for feeding the same toward said guide-plate, pressure rollers for propelling said work past said

cutting element, means for positively driving at least one of said pressure rollers and said cutting element, and rotatable friction members for driving said raising means for said table, said members being disengageable for interrupting said drive for said table to prevent excessive rise of the latter during a cutting operation.

7. An edge-trimming machine including a work-supporting table having means for raising said table as a pile of work thereon is reduced, comprising an edge guide, a rotatable removable wafer blade cutting element projecting beyond said guide, a shearing member, said element being resiliently urged into engagement with said shearing member, said member being resiliently carried in axial direction thereof and being rotatable in a direction opposite to that of said element, means for axially adjusting said shearing member and said element with respect to said edge guide, a feeding roller for delivering said work from above said pile resting on said table toward said guide, pressure rollers for propelling said work through said cutting element and shearing member, and means for positively driving at least one of said pressure rollers, said element and said shearing member, said driving means adapted to actuate the other of said pressure rollers, said feeding roller and said means for raising said table, said table raising means including disengageable friction members to interrupt the drive of said raising means for preventing excessive rise of said table during a cutting operation.

8. An edge-trimming machine provided with a work-supporting table having means for raising said table as a pile of work thereon is reduced, comprising an edge guide, a rotatable renewable wafer blade cutting element projecting beyond said edge guide, a shearing member, said element being resiliently urged into engagement with said shearing member, said member being resiliently carried in axial direction thereof and being rotatable in a direction opposite to that of said element, means for axially adjusting said shearing member and the extent of projection of said element beyond said edge guide, a feeding roller placed slantwise in feeding direction for delivering said work from above said pile toward said edge guide, pressure means comprising a supporting drum and pressure rollers for frictionally cooperating with said drum for guiding work past said element, one of said pressure rollers provided with a resilient tread portion and being located opposite said drum, a resilient annulus on said drum and opposite the other of said pressure rollers, and means for positively driving at least one of said pressure means, said element and shearing member, said driving means being operatively connectable with the other of said pressure means, said feeding roller and said table raising means, said raising means including friction members separable for interrupting the drive of said raising means to prevent excessive rise of said table during a cutting operation.

9. An edge-trimming machine according to claim 8, wherein said pressure roller is provided with a resilient tread portion being mounted on a shaft remote from said cutting element and being partially restrained against movement with respect to said shaft.

10. An edge-trimming machine provided with a work-supporting table comprising a guide-plate for said work, a cutting element extending beyond said table, a rotatable carrier, said carrier being provided with a shearing member, said member cooperating with said cutting element, said element and said carrier being drivingly connected with each other, and rolling means above said carrier and operatively connectable therewith, said rolling means including means angularly disposed in feeding direction with respect to said guide-plate for feeding said work toward said guide-plate and said element upon rotation of said carrier and shearing member.

11. An edge-trimming machine provided with a work-supporting table and means for adjustably raising said table comprising a guide-plate for said work, a cutting element extending beyond said table, a rotatable carrier, said carrier being provided with a shearing member, said member cooperating with said cutting element, said element and said carrier being drivingly connected with each other, and rolling means above said carrier and operatively connectable therewith, said rolling means including frictionally engageable disks for driving said means for raising said table and means angularly disposed in feeding direction with respect to said guide-plate for feeding said work toward said guide-plate and said element upon rotation of said carrier and shearing member.

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