Sept. 28, 1926. 1,601,128

O. D. McFARLAND

APPARATUS FOR SIMULTANEOUSLY CUTTING, SCORING, PUNCHING, AND PERFORMING ANALOGOUS OPERATIONS

Filed May 29, 1924 6 Sheets-Sheet 1

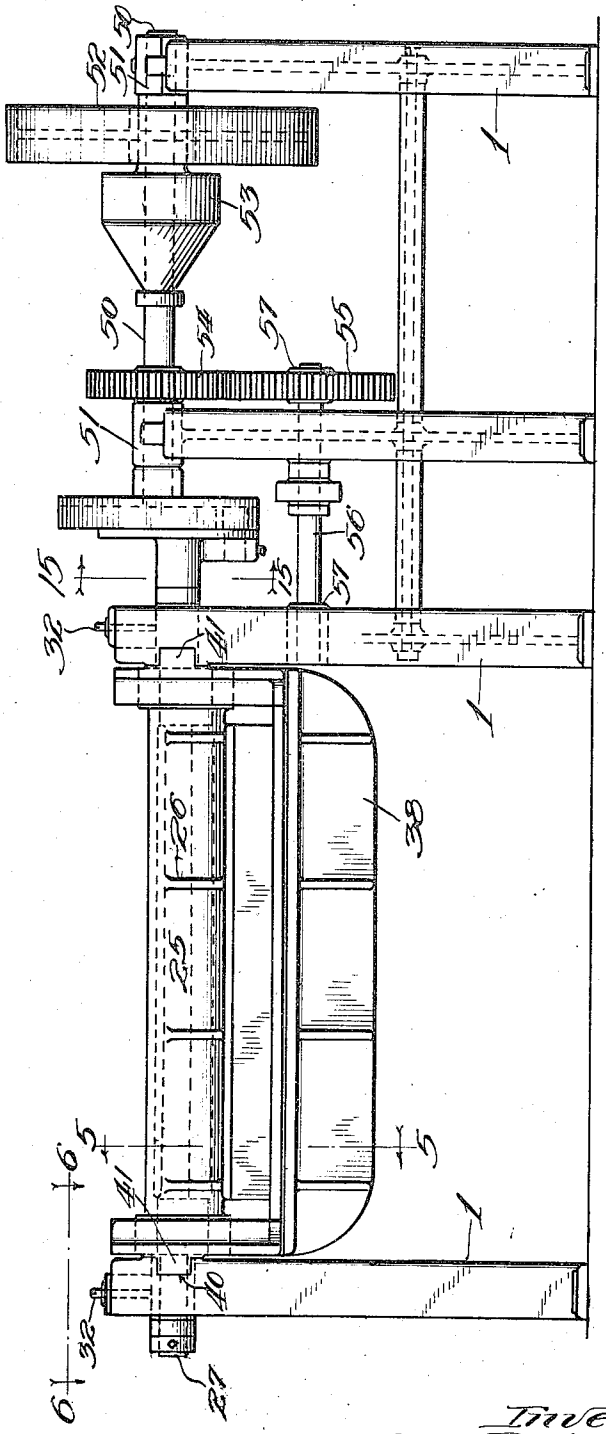


Fig. 1.

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APPARATUS FOR SIMULTANEOUSLY CUTTING, SCORING, PUNCHING, AND PERFORMING ANALOGOUS OPERATIONS

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Fig. 2.

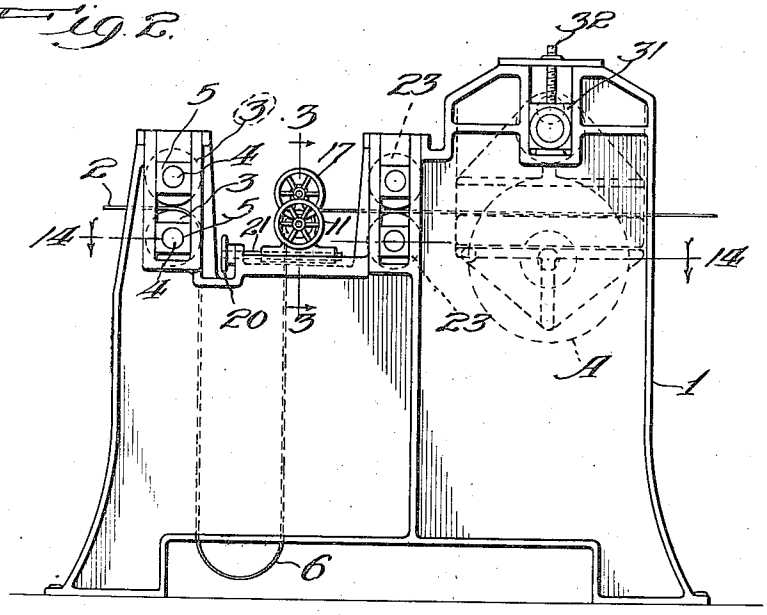


Fig. 3.

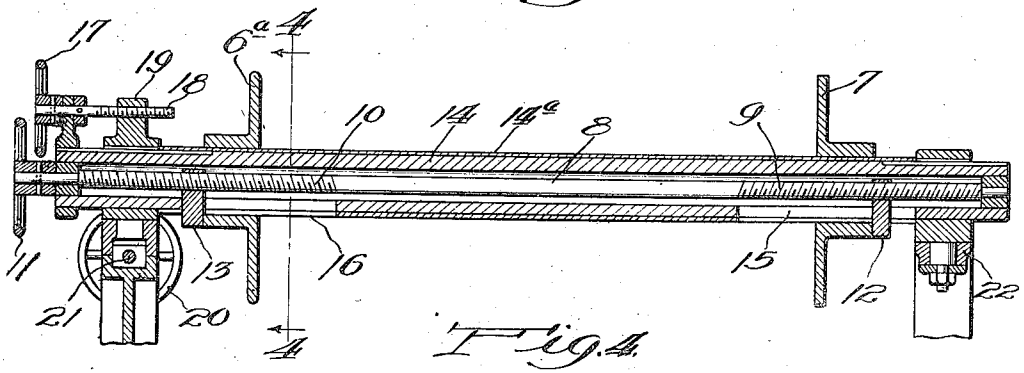
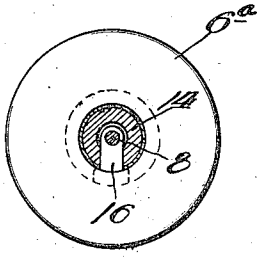


Fig. 4.



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APPARATUS FOR SIMULTANEOUSLY CUTTING, SCORING, PUNCHING, AND PERFORMING ANALOGOUS OPERATIONS

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Fig. 6.

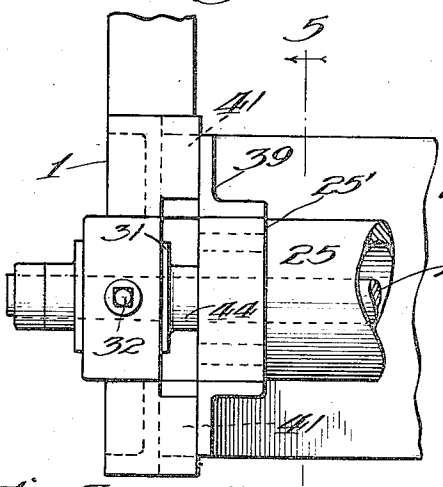


Fig. 5.

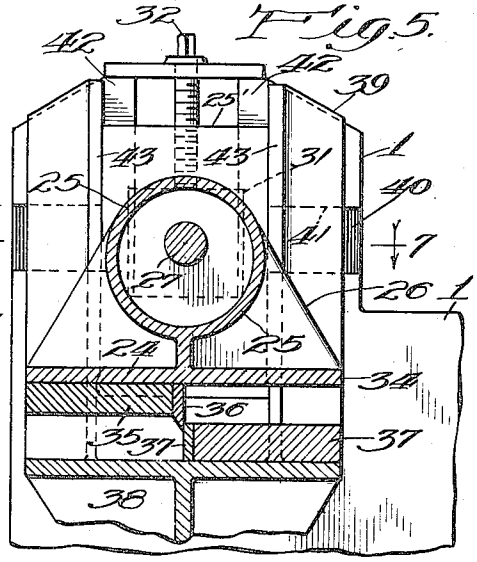


Fig. 7.

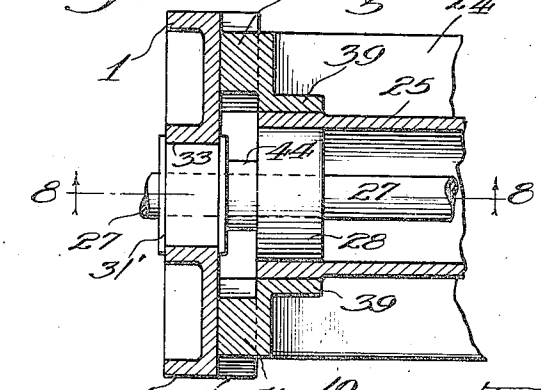
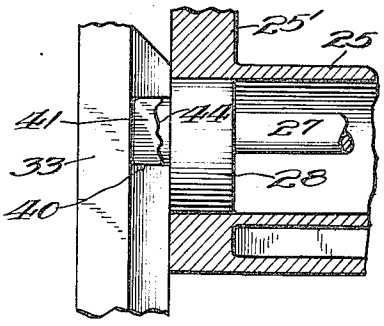


Fig. 8.



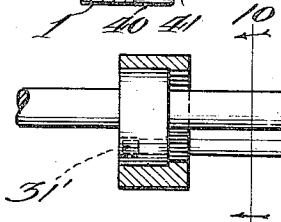
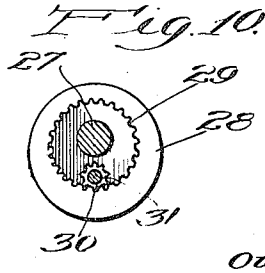


Fig. 9.

Fig. 10.



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APPARATUS FOR SIMULTANEOUSLY CUTTING, SCORING, PUNCHING, AND PERFORMING ANALOGOUS OPERATIONS

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Fig. 11.

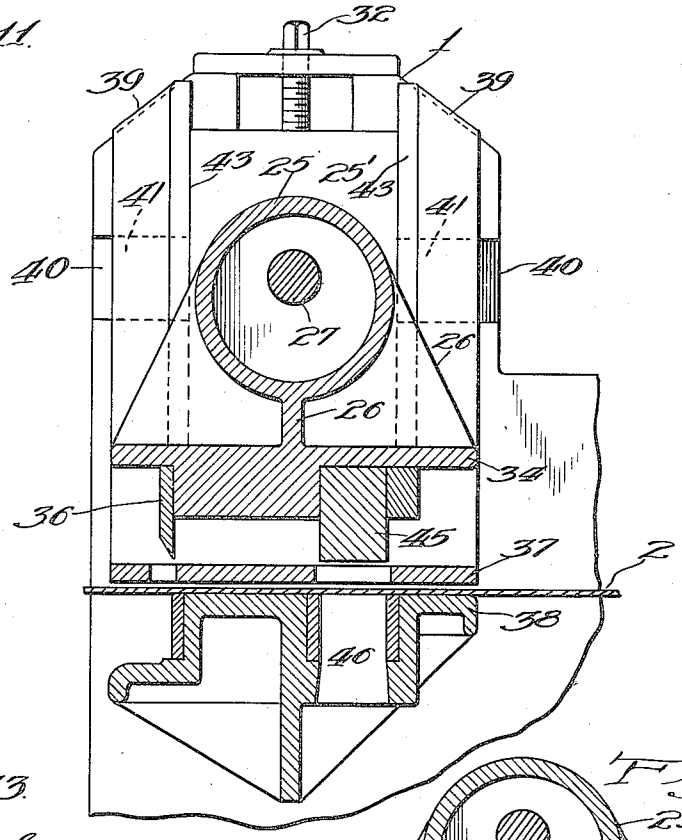


Fig. 13.

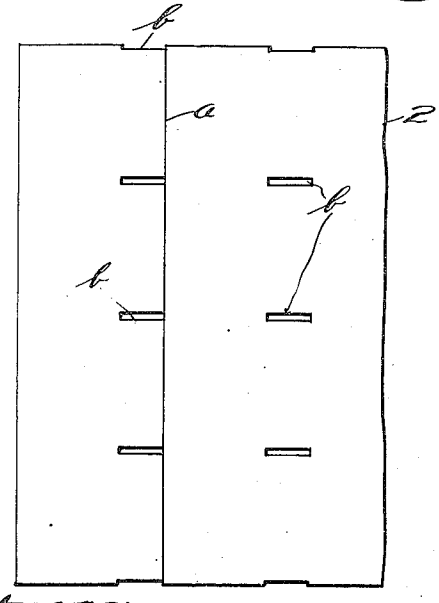
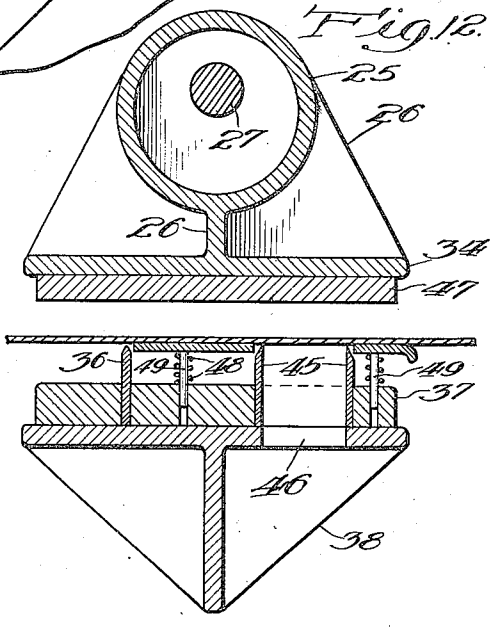


Fig. 12.



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APPARATUS FOR SIMULTANEOUSLY CUTTING, SCORING, PUNCHING, AND PERFORMING ANALOGOUS OPERATIONS

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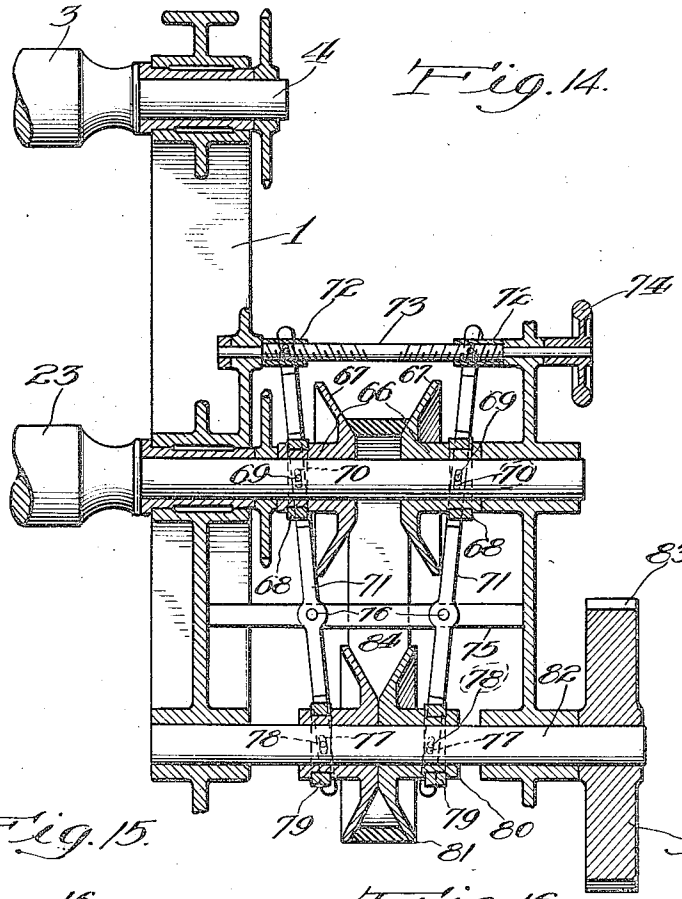
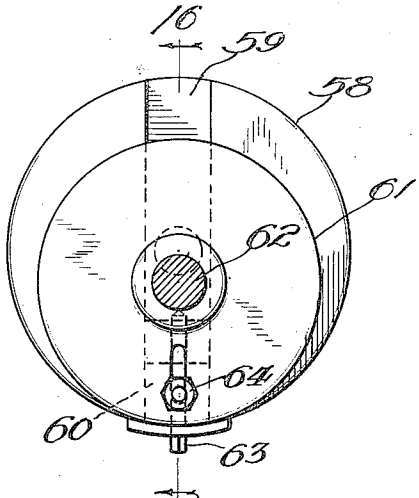
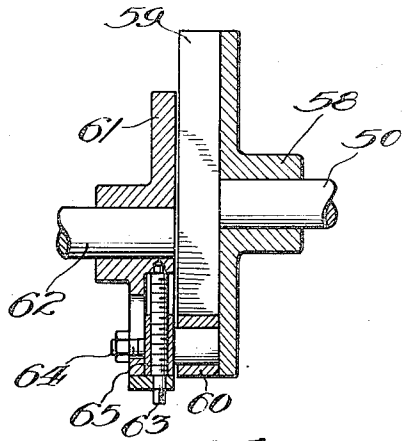


Fig. 14.

Fig. 15.

Fig. 16.





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APPARATUS FOR SIMULTANEOUSLY CUTTING, SCORING, PUNCHING, AND PERFORMING ANALOGOUS OPERATIONS

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Fig. 17.

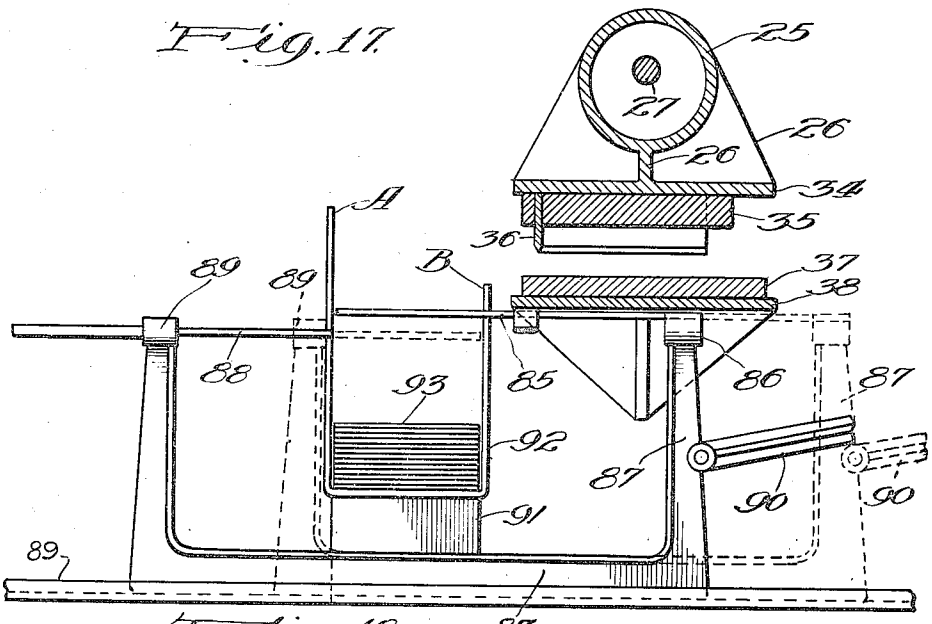
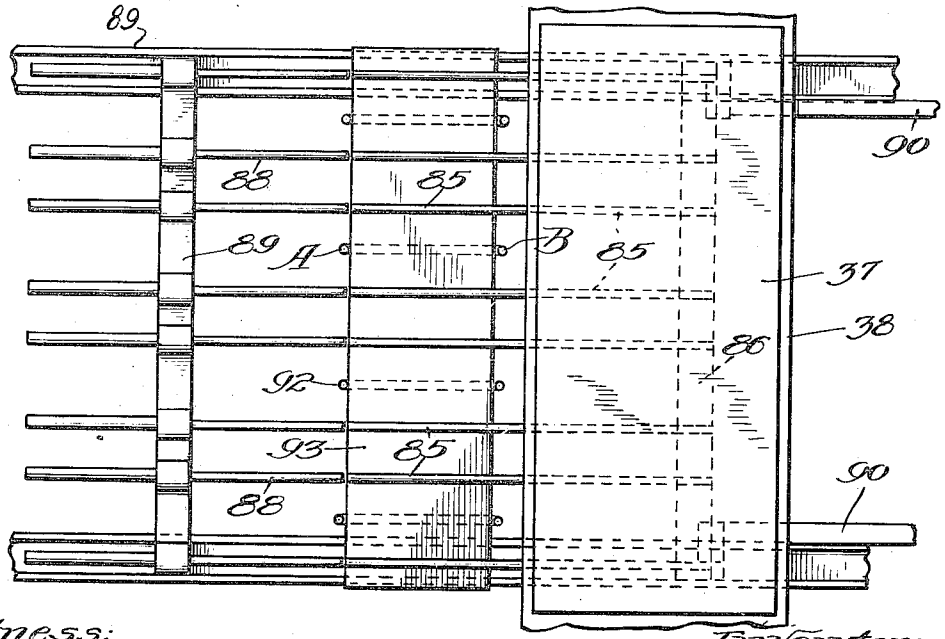


Fig. 18.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR SIMULTANEOUSLY CUTTING, SCORING, PUNCHING, AND PERFORMING ANALOGOUS OPERATIONS.

Application filed May 29, 1924. Serial No. 716,580.

This invention relates to improvements in process and apparatus for performing operations analogous to cutting, scoring and punching, and refers more particularly to a method of making configurations of a predetermined character on a sheet of flexible material and apparatus having a synchronized horizontal and reciprocating movement adapted to economically and accurately carry out the method.

Among the salient objects of the invention are to provide a method and apparatus of the character described, in which a continuous sheet of flexible material is punched and severed to produce individual shingle simulating units; to provide a construction by which numerous operations are simultaneously performed on the sheet, such as scoring, punching, severing, printing, embossing, creasing, waving, perforating and tamping, or any combination thereof; to provide a construction which, through the operation of eccentrics mounted on the drive shaft, produces a synchronized horizontal and reciprocating movement, which, actuating any combination of means for performing the above operations, can be accurately controlled; to provide a construction by which variable speeds can be produced; to provide a novel construction for accurately positioning the side guides to properly guide the travel of the sheet, by an independent adjustment; to provide in a construction of the character last described, means for simultaneously adjusting both sets of guides on either side of the machine with a single independent operation; to provide a process and apparatus particularly adapted for performing any combination of the aforesaid operations on flexible fibrous material such as paper, wallboard, plasterboard, boxboard, roofing felt, copper shingles, and similar materials; to perform a combination of these operations in one operation as the sheet is passing through the machine; to provide a novel form of stacking the severed units after the sheet is severed; and to provide a construction of the character described which is positive in operation, economical in practical use, resulting in maximum production.

In the drawings:

Fig. 1 is a front elevational view of the apparatus with parts in dotted lines.

Fig. 2 is a side elevational view, with parts in dotted lines.

Fig. 3 is a cross sectional view taken on the lines 3—3 of Fig. 2, looking in the direction of the arrows, illustrating the means for adjusting the side guide flanges.

Fig. 4 is a cross section taken on lines 4—4 of Fig. 3 in the direction of the arrows.

Fig. 5 is a cross sectional view on lines 5—5 of Fig. 1.

Fig. 6 is a fragmentary plan view taken on line 6—6 of Fig. 1.

Fig. 7 is a cross sectional view taken on lines 7—7 of Fig. 5.

Fig. 8 is a cross sectional view on the lines 8—8 of Fig. 7.

Fig. 9 is a modified form of the construction shown in Figs. 7 and 8, with parts in section.

Fig. 10 is a section taken on lines 10—10 of Fig. 9.

Figs. 11 and 12 are views similar to Fig. 5 showing different attachments for performing a combination of other operations.

Fig. 13 is a plan view of a sheet which has just been operated upon.

Fig. 14 is a cross section taken on lines 14—14 of Fig. 2.

Fig. 15 is a cross section taken on lines 15—15 of Fig. 1.

Fig. 16 is a cross section taken on lines 16—16 of Fig. 15.

Fig. 17 is a side elevational view of the stacking mechanism.

Fig. 18 is a top plan view of same.

Referring in detail to the drawings, 1 designates the supporting frame. The sheet of flexible material, such as roofing, is fed between the draw rolls 3 mounted on shafts 4, the latter being journalled in the square bearings 5, the arrangement being such that these rolls are vertically adjustable. In order to insure a proper feed, a loop such as shown at 6, is made in the usual manner.

Referring now to one of the features of the invention, as shown clearly in Figs. 3 and 4, the circular side guide flanges 6ª and 7 are horizontally adjustable on the shafts, the arrangement being such that both flanges are simultaneously moved inwardly or outwardly through one adjustment. This may be accomplished by means of the trans-

versely extending screw 8 being screw threaded at 9 and 10 in the form of what may be termed a right and left screw thread. A hand wheel 11 is attached to the member 8. The flanges 6^a and 7 have screw threaded studs 12 and 13 engaging the screw threaded portions 9 and 10. These flanges extend around the periphery of the shaft or roll 14, which may be provided with the outside pipe 14^a, adapted to be replaced when worn. The roll 14 preferably has portions cut away on its periphery, as shown at 15 and 16, to allow for the inward movement of the flanges.

The entire construction just described is capable of transverse movement through the hand wheel 17 and screw 18, the latter registering with the screw threaded portion of the stud 19. By manipulation of the hand wheel 20 and screw 21, the entire construction explained in the preceding paragraph can be tilted to any desired angle, through the pivot arrangement 22.

The sheet 2, after being properly guided by the side guide flanges just described, passes through a second set of draw rolls 23, similar to the draw rolls 3 and likewise vertically adjustable. After leaving these last mentioned draw rolls 23, the paper is ready to be cut.

Referring now to the mechanism for causing the synchronized horizontal and reciprocating movement, with particular reference to Fig. 5, the casting 24 having the closed central portion 25 on which is mounted the upstanding block 25′ and ribs 26, encloses the transverse shaft 27, adjacent both ends of which are mounted the eccentrics 28. The arrangement may be as explained, namely, single eccentrics on both ends of the shaft 27 or, as shown in Figs. 9 and 10, there may be provided a double eccentric arrangement, comprising eccentrics 28 and 28′, the latter internally geared as shown at 29, the latter being adapted to mesh with the smaller gear 30 mounted on shaft 31. The use of the single or double eccentric arrangement is, of course, optional.

Returning now to Fig. 5, mounted on the frame and receiving the shaft 27 are the square bearings 31′, which are vertically adjustable by means of the screw 32, in the slideway 33, the side walls of the bearing overlapping the slideway as shown clearly in Fig. 7. The lower portion of the casting 24 has an integral flat plate 34, on which may be mounted the various knives, punches, and other mediums for operating on the sheet, as hereinbefore set out. In the construction shown in Fig. 5, the plate 34 is shown as provided with the block 35 and knife 36, the latter adapted to cut against the plates or blocks 37 positioned above the stationary lower bed 38. The blocks 37 are fixedly attached to the supporting racks 39 adapted to slide horizontally in the grooved slideways 40 through communication with the bosses 41 which are fixedly attached to the racks 39. The grooved portions 40 are cut into the stationary frame.

The supporting racks 39 are centrally cut away having the inturned lips 43 forming, in effect, side guide flanges. Through the arrangement thus described, as the shaft 27 is rotated, the travel of the eccentrics 28 within the casting 25 will cause the casting 24, with its connected parts, such as the plate 34, block 35, knife 36, etc., to reciprocate vertically in the rack 39. Simultaneously, the latter on which is mounted the lower plate or block 34 is moved horizontally in the groove 40 of the frame 2 through the bosses 41 positioned thereon as explained. It will thus be seen that there is secured a synchronized horizontal and vertical movement. A collar 44 (Fig. 7) surrounds the shaft, and is positioned between the eccentric and square bearing.

Referring now to Figs. 11 and 12, I have shown in Fig. 11, a similar arrangement to that shown in Fig. 5, and in addition to the knife 36, I have provided a punch 45, both knife and punch registering with recesses in the lower plate 37, as shown. The waste from the punching operation may be withdrawn through the cutaway portion 46 in the lower bed.

In the construction shown in Fig. 12, the knives 36 and punches 45 are mounted on the bottom plate 37, the upper plate 34 being provided with the plain surfaced block 47 against which the knives and punches cut. Spring tension may be supplied through the coil springs 48 and pins 49, as shown. In Fig. 13, I have shown one form of shingle which can be produced by the mechanism shown in Figs. 11 and 12, the line of severance a being formed by the knife 36 and the notched portion b formed by the punches 45. The punches b are first formed in the sheet and as it moves forward, the knife 36 severs the sheet along the line of severance a, into a plurality of shingle units.

Describing now the drive and mechanism for imparting variable speeds to the machine, on the end of the main drive shaft 50 journalled or otherwise mounted in bearings 51, is a pulley wheel 52 driven from any suitable source of power. Any desired clutch arrangement 53 may be mounted on the shaft 50 adjacent the pulley. The gear 54 is mounted on the shaft 50, which gear 54 meshes with a similar gear 55 mounted on the shaft 56 journalled as shown at 57 in the frame. The drive from the gear 55 can be transmitted to any desired mechanism which may be attached to this machine.

The inner end of the shaft 50 terminates

in eccentric disk 58, having a square duct or slot 59 centrally disposed in its surface opposite the connection with the shaft. This slot 59 is adapted to register with a square boss 60 fixedly mounted and carried by the relatively smaller disk 61, which is mounted on shaft 62, the arrangement being such that as the disk 58 revolves with the shaft 50, the boss 60 will move in the grooved slideway 59 and vary the speed of rotation of the disk 61; in other words, in one revolution of the disk 61, the speed will vary from slow to fast, and will be rotating slowly when it completes the revolution, while the disk 58 is continuously rotating at a constant speed.

When it is not desirable to vary the speed, or desirable to limit the speed variation, the vertical screw threaded pin 63, fixedly set in the disk 61, will move the disk 61 and shaft 62 to a position where both shafts will be in the same horizontal plane, and hence, will rotate at the same speed. The pin 63 is fixedly held from accidental movement by means of the set screw 64 abutting on the screw thread sleeve 65.

I have shown and described one form of variable speed mechanism. Referring now to Fig. 14, I have shown another form which may be used. Mounted on the shaft 23 are adjustable sleeves 66, the inner end of each terminating in the outward tapering guide flanges 67. The sleeves 66 are provided with the annular collars 68, which latter have a pin projection 69, adapted to register with an elongated slot 70 in each of the connecting rods 71. The upper ends of the rods 71 are fixedly attached to oppositely screw threaded sleeves 72 adapted to register with the screw threaded pin 73 having right and left screw threads and having handle 74. Below the shaft 23 the connecting rods may have pivotal connection with a cross bar 75, as shown at 76. The extreme lower extremities of the rods 71 are slotted at 77 to register with pins 78 mounted on collars 79, the latter being mounted on the sleeves 80 terminating in tapering flanges 81, the arrangement being similar to the arrangement on the shaft 25. The sleeves 80 encircle the shaft 82, which latter is provided with the large gear 83. A pulley or endless belt 84 is adapted to be mounted between the flanges.

The operation is immediately apparent. The shaft 25 is continuously rotating at a uniform speed, while the speed of rotation of the shaft 82 may be varied by causing the belt 84 to have a longer or shorter travel around the expanding and contracting flanges by manipulation of the handle 74, and screw 73.

Describing now the apparatus for stacking the shingle units, after they have been cut, notched, etc., the severed sheet falls upon the horizontal spaced apart rods 85. One end of the rods is free, while the other end of each is held in the transverse bar 86 mounted on the skeleton frame 87.

A similar series of spaced apart rods 88 having one end held in the bracket 89 positioned on the frame 87, are placed on slightly lower level than the rods 85 to avoid danger of contact. The entire frame 87, with brackets 86 and 89, and rods 85 and 88, is horizontally movable on the track 89′, the arm 90 connected to the frame 87, communicating with any source of power and preferably driven in timed relation with the rest of the mechanism.

A stationary block 91 having the U-shaped upwardly extending rods 92 form the holding means or container for the severed sheets 93. The arrangement is such that, as the sheet 93 is severed, it falls upon the series of rods 85 and is carried to a point within the space between the upper terminations A and B of the U-shaped arrangement 92, the frame 87 being driven forward corresponding to the position shown in full lines in Fig. 17. On the return movement of the frame, the projection B will prevent the shingle from being carried back by the rods 85. As the latter clear the space between the portions A and B, the shingle will fall onto the rods 88. The position at this time is as shown in dotted lines in Fig. 17. On its forward movement, another shingle will be carried forward by the rods 85, and the preceding shingle just described is prevented from being carried back by the rods 88 by the extensions A, will fall onto the stack, as soon as the rods 88 clear the extensions A. The purpose and advantages of this feature will be readily apparent. The newly severed sheet is prevented from buckling and tearing, and is stacked in a uniform pile, instead of shingles extending in all directions. This feature is particularly applicable to combination with the feature of synchronized vertical and horizontal movement.

I claim as my invention:

1. In an apparatus of the character described, means for guiding the lateral edges of a moving sheet, comprising flanges simultaneously movable inward or outward mounted on a transversely movable frame, and means for severing the sheet into individual shingle elements.

2. In an apparatus of the character described, the combination with means for feeding a sheet, of simultaneously adjustable flanges for guiding said sheet, means for operating on said sheet, said means adapted to have a synchronized horizontal and vertical movement and, including severing means for removing the severed sheet.

3. In an apparatus of the character described, the combination with means for

feeding a sheet, of simultaneously adjustable flanges for guiding said sheet, means for operating on said sheet, said means adapted to have a synchronized horizontal and vertical movement and including severing means, a horizontally movable element having retaining means positioned thereon for receiving the severed sheet and means for forming the severed sheets into a stack.

4. In an apparatus of the character described, the combination with means for feeding a sheet, of simultaneously adjustable flanges for guiding said sheet, means for operating on said sheet comprising vertically movable means slidable in a horizontally movable means, rotating eccentrics actuating the vertically movable means, severing means thereon, and means for removing the severed sheets.

5. In an apparatus of the character described, the combination with means for feeding a sheet, of simultaneously adjustable flanges for guiding said sheet, means for operating on said sheet comprising vertically movable means slidable in a horizontally movable means, rotating eccentrics actuating the vertically movable means, severing means thereon, means for varying the speed of the eccentrics during each rotation thereof.

6. In an apparatus of the character described, the combination with means for feeding a sheet, of simultaneously adjustable flanges for guiding said sheet, means for operating on said sheet, comprising vertically movable means slidable in a horizontally moving means, rotating eccentrics actuating the vertically movable means, severing means thereon, means for varying the speed of the eccentrics during each rotation thereof, comprising a grooved rotating disk and an opposed smaller disk carrying means registering with the groove, the latter disk being adjustable to vary the relation between the two disks.

7. In an apparatus of the character described, means for guiding the lateral edges of a moving sheet comprising flanges simultaneously movable inward or outward mounted on a frame, means for transversely moving as a unit said frame containing the flanges, the frame being pivoted at one end permitting same to be swung in an arc relative the sheet, and means for severing the sheet into individual shingle elements.

8. In an apparatus of the character described, the combination with means for feeding a sheet, means for operating on said sheet comprising vertically movable means slidable in a horizontally movable means, rotating eccentrics actuating the vertically movable means, severing means thereon, and means for removing the severed sheets.

9. In an apparatus of the character described, including means for feeding a continuous strip of material, means for operating on said sheet comprising vertically movable means slidable in a horizontally movable means, punching and slitting means thereon, and means for removing the severed sheets.

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