

July 11, 1944.

H. J. GREENE

2,353,232

PUNCHING AND REINFORCING DEVICE

Filed Nov. 5, 1940

2 Sheets-Sheet 1

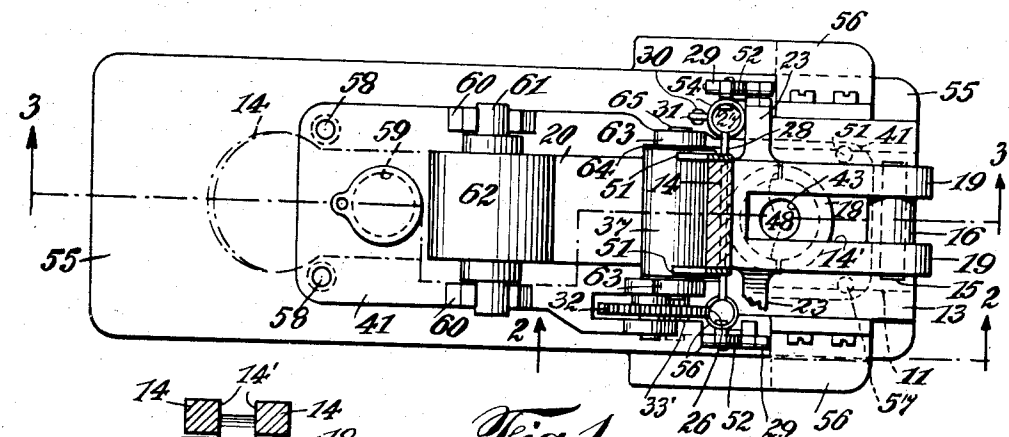


Fig. 1.

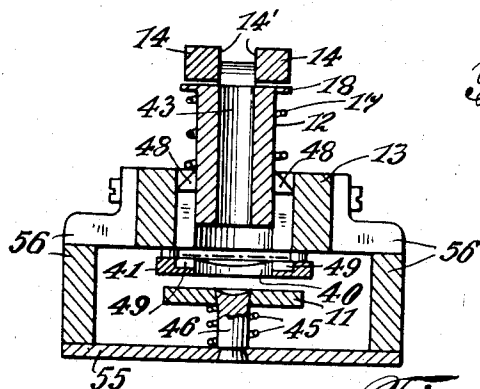


Fig. 4.

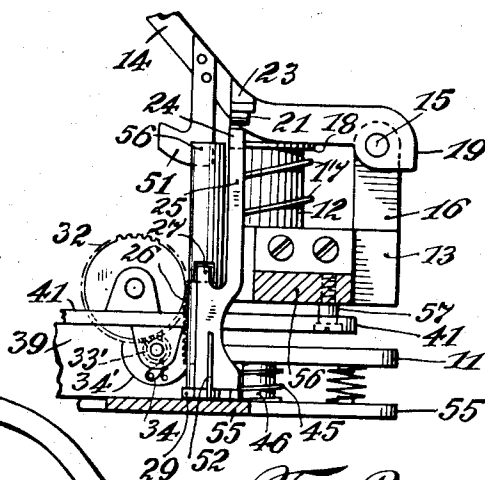


Fig. 2.

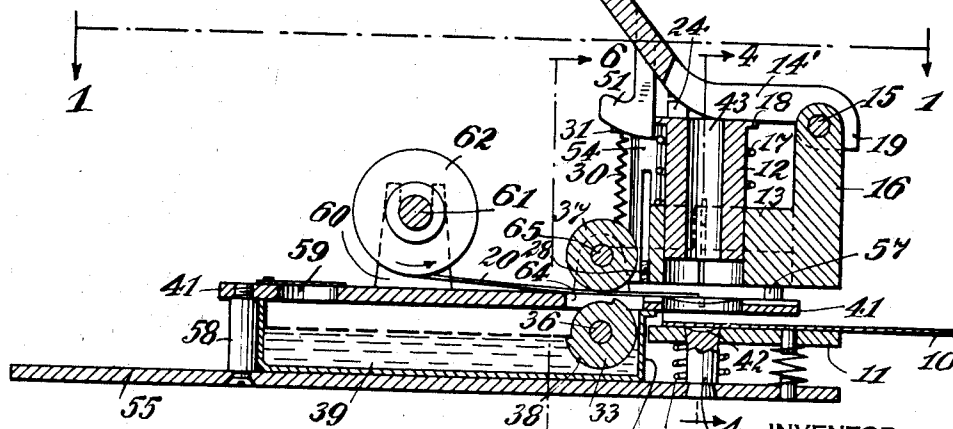


Fig. 3.

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2 Sheets-Sheet 2

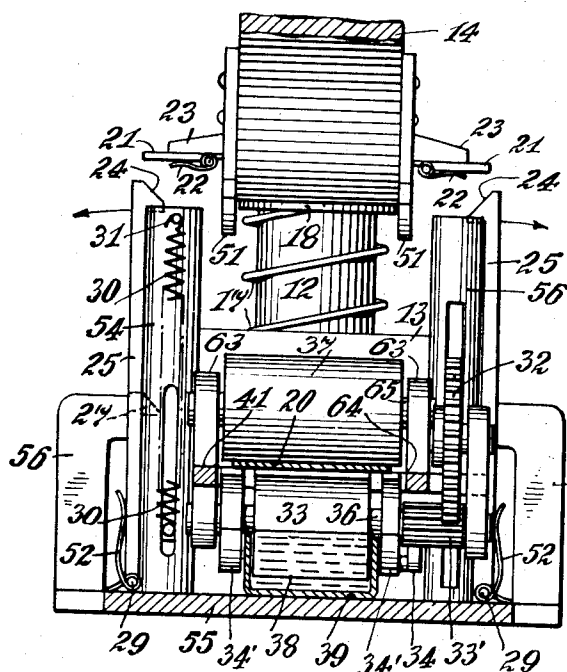


Fig. 6.

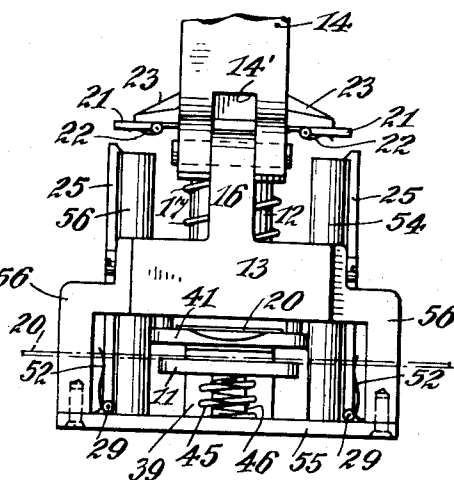


Fig. 5.

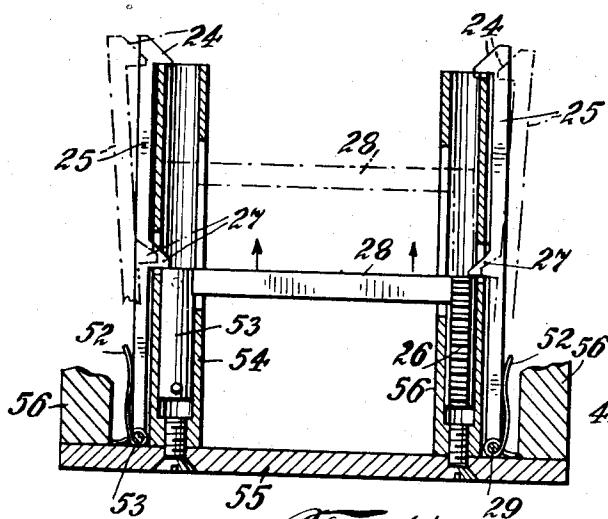


Fig. 7.

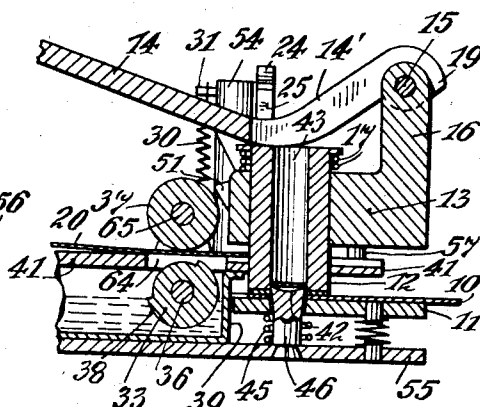
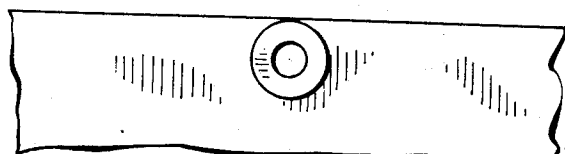


Fig. 8.



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PUNCHING AND REINFORCING DEVICE

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10 Claims. (Cl. 93—1)

This invention relates to certain improvements in methods for feeding, moistening, cutting and applying a web.

In particular the improvements have been described as applied to a device for punching and reinforcing, but modern business produces many occasions when it is convenient to have a web automatically fed from a roller, and perhaps cut and moistened, or even applied to a working surface.

In the form of the invention herein disclosed a punching device is adapted to wet and feed forward a reinforcing strip above the work sheet to be punched and reinforced, so that the strip covers an area large enough for satisfactory reinforcing.

A punching plunger is then shown as descending to punch out a reinforcing disc. The plunger is shown as descending further to affix the disc to the worksheet, and then as carrying both against a punch pillar to punch a central opening in the disc, the opening also being punched through the worksheet, thus finishing the punching and reinforcing.

When the plunger rises it carries up the punched out center of the disc and the accumulated centers coming from the subsequently punched discs feed upward through the hollow plunger.

If a strip of reinforcing material is wider than the reinforcing disc, the device may be provided with a knife or knives, as shown, to cut off the scrap before it gets in the worker's way.

Other features and advantages will herein-after be shown and described.

In the accompanying drawings,

Figure 1 is a plan view of the device with parts broken away, on the line 1—1 of Fig. 3.

Figure 2 is a fragmentary side view taken on the line 2—2 of Figure 1.

Figure 3 is a longitudinal section on the line 3—3 of Figure 1.

Figure 4 is a sectional end view on the line 4—4 of Figure 3.

Figure 5 is a front view of the device.

Figure 6 is an enlarged sectional view on the line 6—6 of Figure 3.

Figure 7 is a sectional view to show the operation of the driving rack.

Figure 8 is a view similar to Figure 3 but showing the parts at the point of fixing the reinforcement.

Figure 9 shows a reinforced margin of a sheet of paper.

In the form shown a sheet of paper 10 to be

reinforced is inserted upon the spring supported platform or movable table 11 of the device beneath the slidable round punching plunger 12.

The plunger 12 slides in a standard or housing 13 under the pressure of a forked handle 14 which is pivoted at 15 in a forward projection 16 of the housing 13.

Normally the plunger 12 is held up by a spring 17 which bears against the top of housing 13 and against a projecting top shoulder 18 of the plunger.

Normally the handle 14 is held up by spring 17 so that its stop 19 bears against the front of the projection 16. When the handle 14 is initially depressed it moves the plunger idly but, while moving idly, it trips a feed drive to feed forward the reinforcing tape 20 which is to be punched to reinforce the paper.

For this purpose, the handle 14 carries a pair of hinged trips 21, shown as held by springs 22 against lugs 23 on the handle 14. As the handle 14 initially descends the trips 21 strike and cam outward the inclined ends 24 of triggers 25 which have been holding down a drive rack 26.

To thus hold the rack 26, the triggers 25 include lower lugs 27 which overlie the ends of a frame 28. The frame 28 carries the rack 26, and, when the trips 21 swing the triggers 25 outward around their bottom pivots 29, the lower lugs 27 swing clear of the frame 28 and the frame 28 with its rack 26 springs up under the tension of its spring 30 which is anchored in a top lug 31 of the tube 56 in which the rack 26 runs.

The springing up of the rack 26 is shown as feeding the adhesive reinforcing tape forward the proper space for one reinforcing. For thusly feeding or advancing the tape, the rack 26 is shown as meshing with a drive gear 32 (Fig. 2), which in turn meshes with a pinion 33' on the lower shaft 36 that carries a fixed wetting and feeding roller 33. The pinion 33' is loose on shaft 36, but is capable of rotating the shaft and feed roller 33 in one direction only, by reason of a spring urged pawl 34 engaging the teeth of the pinion. The pawl is pivoted upon a fixed enlargement 34' of the shaft, and as the rack 26 springs upwardly to rotate gear 32 and roller 37 in counter-clockwise direction, pinion 33' is driven in the opposite direction, carrying with it the pawl 34, which in turn carries around with it the shaft 36 and its fixed feed roller 33. Upon resetting of the rack to the lowered position, gear 32 is rotated thereby in clockwise direction, and thus drives the pinion 33' in the opposite direction; but no movement is then imparted to feed

roller 33 because the pawl rides idly over the pinion teeth when the pinion is rotated in that direction, and may not therefore drive the shaft 36 of the feed roller. Thus when the rack 26 goes up it turns the roller 33, and the distance the rack 26 thus goes up is shown as just sufficient to feed forward a length of tape 20 to serve for a single reinforcing.

In the form shown the roller 33 cooperates with an upper pressure roller 37 to ensure proper feeding of the tape 20, but the effective periphery of the roller 33 extends only part way around so that normally the initial feeding of the tape 20 is begun by a wet part of the periphery 38, due to the fact that the effective periphery which first strikes the tape 20 normally lies submerged in the water of a bath 39 with the leading edge of the periphery 38 submerged in the water.

The trailing part of the periphery 38 is wetted by the water as the roller 33 turns.

The wetting and feeding of the tape 20 just described takes place in the initial part of the downward movement of the handle 14.

During the later downward movement of the handle the plunger 12 moves down to cutting position, carrying the tape 20 down (if need be), so that the tape 20 overlies an opening 40 in the support 41, Figs. 4 and 3. The edge of the opening 40 serves as a cutting edge for the tape 20 and as the plunger 12 continues to descend, it cuts out a circular disc of wetted tape which is to serve as reinforcing material for the paper, 10.

The further descent of the plunger 12 carries the moistened circular disc against the sheet of paper which has been placed upon the platform 11 so that the wet side of the disc adheres to the paper 10.

A further final descent of the plunger 12 carries down the paper, now covered with its reinforcing disc, so that the paper and the platform 11 move down and a fixed bottom cutter 42 cuts out the center of the reinforcing disc.

To enable this to be done efficiently the plunger 12 is vertically bored as at 43, so that the inner edge of the bore fits the round periphery of the bottom cutter 42 and makes a clean cut, removing the cut-out center because that center sticks in the bore 43 until finally forced out of the top through the forked handle opening 14' by subsequent cutout centers forced into the bore by subsequent operations of the device when applying other reinforcements.

To permit the platform 11 to thus operate it is shown as supported by springs 45, one around the stem 46 of the bottom cutter 42 and one nearer the front of the device, the stem 46 and the front 47 of the tank 39 serving as guides.

To cut off scrap, if the tape 20 is wider than the diameter of the plunger 12, there are shown cutting blades 48, one on each side of the plunger 12, and descending with it and entering openings 49 in the support 41, thus severing the tape when a reinforcing disc is cut from it.

While the handle 14 is thus descending to cut out and affix the reinforcing disc, the handle 14 at the same time is resetting the rack 26 to provide for feeding the tape for a subsequent reinforcing disc.

To accomplish this resetting, the rack frame 28 is so located that a driving cam 51 on each side of the handle 14 strikes the frame bar 28 after the above-described idle motion and cams the frame 28 with its rack 26 down against the tension of its spring 30 until, near the end of the

stroke of the handle 14, the ends of the frame 28 are below the lugs 27, thus permitting the springs 52 to swing the triggers 25 inward and catch the frame 28 and thus hold the rack down ready for another release.

The frame 28 is attached to a vertical slide 53 which runs in a slotted tube 54 fastened to the base 55, similarly to the slotted tube 56 in which runs the rack 26.

The pivot 15 on which swings the handle 14, is well toward the front, and to support the projection 16 in which it is carried the base 55 is provided with outside forwardly projecting arms 56 uniting at the front to form the projection 16.

The support 41 may be supported by a screw 57 from the projection 16 and at the back by a standard 58 fastened to the base. Through the support 41 water may be poured at a closed opening 59 to fill the tank 39 to the proper level. The support may include standards 60 carrying a shaft 61 to hold the roll 62 from which is drawn the tape 20. Other standards on each side of an opening 64 serve to carry a shaft 65 for the pressure roll 37.

In order to eliminate accidental sticking of the sheet or tape to the support 41, it is shown as dished transversely (see Figures 4, 5, 8), the dishing extending from near the roller 36 to the front.

Having thus described in some detail one embodiment of the invention, what is claimed is:

1. In a reinforcing device a hollow plunger having an outer cutting edge, a cooperating cutting edge to cut out a reinforcing disc, an inner cutting edge on the plunger, and a second cutting edge to cooperate with the inner cutting edge to cut an opening in the disc, and simultaneously cut the opening in the work sheet, and a device for trimming off waste.

2. In a device of the class described, the combination of a support including a cutting die opening to underlie an adhesive web to be advanced intermittently across said opening, a reciprocable plunger die means including a cutting edge and a pressing face to enter the die opening, thereby to punch a patch from the web and advance the patch through the opening and onto a work sheet poised beneath the cutting die opening, an actuator for reciprocating the plunger die means, and web advancing means including a movable web contacting member, a quick-action spring drive means for said web contacting member, means operative to energize the spring drive means upon movement of the plunger die in one direction relative to the cutting die opening, means latching the spring drive means in the energized condition, and means operative upon initial advancement of the plunger die toward the work sheet, for tripping the latching means and thereby placing the web advancing means under the influence of the spring drive means to advance the web independently of the plunger die advancing movement.

3. In a device of the class described, the combination of a support including a cutting die opening to underlie an adhesive web to be advanced intermittently across said opening, a reciprocable plunger die means including a cutting edge and a pressing face to enter the die opening, thereby to punch a patch from the web and advance the patch through the opening and onto a work sheet poised beneath the cutting die opening, an actuator for reciprocating the

plunger die means, and web advancing means including a movable web contacting member, a quick-action spring drive means for said web contacting member, means operative to energize the spring drive means upon movement of the plunger die in one direction relative to the cutting die opening, means latching the spring drive means in the energized condition, and means associated with the plunger die means actuator, to trip the latch means and thereby place the web advancing means under the driving influence of the spring drive means, in advance of movement of the plunger die means to web cutting position.

4. In a device of the class described, the combination of a support including a cutting die opening to underlie an adhesive web to be advanced intermittently across said opening, a reciprocable plunger die means including a cutting edge and a pressing face to enter the die opening, thereby to punch a patch from the web and advance the patch through the opening and onto a work sheet poised beneath the cutting die opening, an actuator for reciprocating the plunger die means, and web advancing means including a movable web contacting member, a quick-action spring drive means for said web contacting member, means operative to energize the spring drive means upon movement of the plunger die in one direction relative to the cutting die opening, means latching the spring drive means in the energized condition, and means operative upon initial advancement of the plunger die toward the work sheet, for tripping the latching means and releasing the web advancing means to the driving influence of the spring drive means, thereby to advance the web independently of plunger die advancement, and a secondary punching means subsequently operative to perforate the web and the work-sheet.

5. In a device of the class described, the combination of a support including a cutting die opening to underlie an adhesive web to be advanced intermittently across said opening, a reciprocable plunger die means including a cutting edge and a pressing face to enter the die opening, thereby to punch a patch from the web and advance the patch through the opening and onto a work sheet poised beneath the cutting opening, an actuator for reciprocating the plunger die means, and web advancing means including a movable web contacting member, means to moisten said web contacting member for effecting transfer of moisture to the adhesive web, and rendering same tacky for adhesion to the work-sheet, means operative to energize the spring drive means upon movement of the plunger die in one direction relative to the cutting die opening, means latching the spring drive means in energized condition, and means operative upon initial advancement of the plunger die toward the work sheet, for tripping the latching means and thereby placing the web advancing means under the influence of the spring drive means to advance the web independently of the plunger die advancing movement.

6. In a device of the class described, the combination of a support including a cutting die opening to underlie an adhesive web to be advanced intermittently across said opening, a reciprocable plunger die means including a cutting edge and a pressing face to enter the die opening, thereby to punch a patch from the web and advance the patch through the opening and onto

a work sheet poised beneath the cutting die opening, an actuator for reciprocating the plunger die means, and web advancing means including a movable web contacting member, a quick-action spring drive means for said web contacting member, means operative to energize the spring drive means upon movement of the plunger die in one direction relative to the cutting die opening, means latching the spring drive means in the energized condition, and means operative upon initial advancement of the plunger die toward the work sheet, for tripping the latching means and thereby placing the web advancing means under the influence of the spring drive means to advance the web independently of the plunger die advancing movement, and means precluding actuation of the movable web contacting member as the plunger die means is retracted to energize the spring drive means aforesaid.

7. In a device of the class described, the combination of a support including a cutting die opening to underlie an adhesive web to be advanced intermittently across said opening, a reciprocable plunger die means including a cutting edge and a pressing face to enter the die opening, thereby to punch a patch from the web and advance the patch through the opening and onto a work sheet poised beneath the cutting die opening, an actuator for reciprocating the plunger die means, and web advancing means including a movable web contacting member, a quick-action spring drive means for said web contacting member, means operative to energize the spring drive means upon movement of the plunger die in one direction relative to the cutting die opening, means latching the spring drive means in the energized condition, and means operative upon initial advancement of the plunger die toward the work sheet, for tripping the latching means and thereby placing the web advancing means under the influence of the spring drive means to advance the web independently of the plunger die advancing movement, and means movable toward the web with each advancing movement of the plunger die, for trimming waste from the web at opposite sides of the patch.

8. In a device of the class described, the combination of a support having a dish-like groove extending longitudinally thereof, and including a cutting die opening in the dished portion of the support to underlie an adhesive web to be advanced intermittently lengthwise of said dished portion and across said opening, a reciprocable longitudinally bored plunger die including a cutting edge and a pressing face to enter the die opening, thereby to punch a patch from the web and advance the patch through the die opening and toward a work sheet placed beneath said opening, a perforated work sheet supporting table located beneath the die opening in substantial parallelism with the plane of said opening, means yieldingly supporting said table for movement with the plunger die when struck thereby, a stationary perforating die upstanding beneath the table and located for entry into the perforation of the table when the table is depressed by the plunger die, said perforating die cooperating with the longitudinal bore of the reciprocable plunger die to perforate a work sheet supported upon the table, and means for intermittently advancing an adhesive web between the reciprocable plunger die and the dished support, in alternation with successive patch advancing movements of the plunger die.

9. In a device of the class described, the com-

combination of a support having a dish-like groove extending longitudinally thereof, and including a cutting die opening in the dished portion of the support to underlie an adhesive web to be advanced intermittently lengthwise of said dished portion and across said opening, a reciprocable longitudinally bored plunger die including a cutting edge and a pressing face to enter the die opening, thereby to punch a patch from the web and advance the patch through the die opening and toward a work sheet placed beneath said opening, a perforated work sheet supporting table located beneath the die opening in substantial parallelism with the plane of said opening, means yieldingly supporting said table for movement with the plunger die when struck thereby, a stationary perforating die upstanding beneath the table and located for entry into the perforation of the table when the table is depressed by the plunger die, said perforating die cooperating with the longitudinal bore of the reciprocable plunger die to perforate a work sheet supported upon the table, and spring motor operated means for intermittently feeding an adhesive web over the die opening, between successive advancing movements of the plunger die, at a rate of feed entirely independent of the speed of the plunger die advancing movement.

10. In a device of the character described, the combination of a support including a cutting die opening to underlie a web to be advanced intermittently across said opening, a reciprocable plunger die means including a cutting edge and a pressing face to enter the die opening, thereby to punch a patch from the web and advance the patch through the opening and onto a work piece poised beneath the cutting die opening, an actuator for reciprocating the plunger die, means rendering the web tacky for adhesion to said work piece, and web advancing means including a movable web contacting member, a quick-action spring drive means for said web contacting member, means operative to energize the spring drive means upon movement of the plunger die in one direction relative to the support, means latching the spring drive means in the energized condition, and means operative upon initial advancement of the plunger die toward the work piece, for tripping the latching means and placing the web advancing means under the driving influence of the spring drive means, thereby to advance the web independently of the plunger die advancing movement.

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