April 8, 1941. F. J. BREMAN 2,238,010

STACKER

Filed May 9, 1938 2 Sheets-Sheet 1

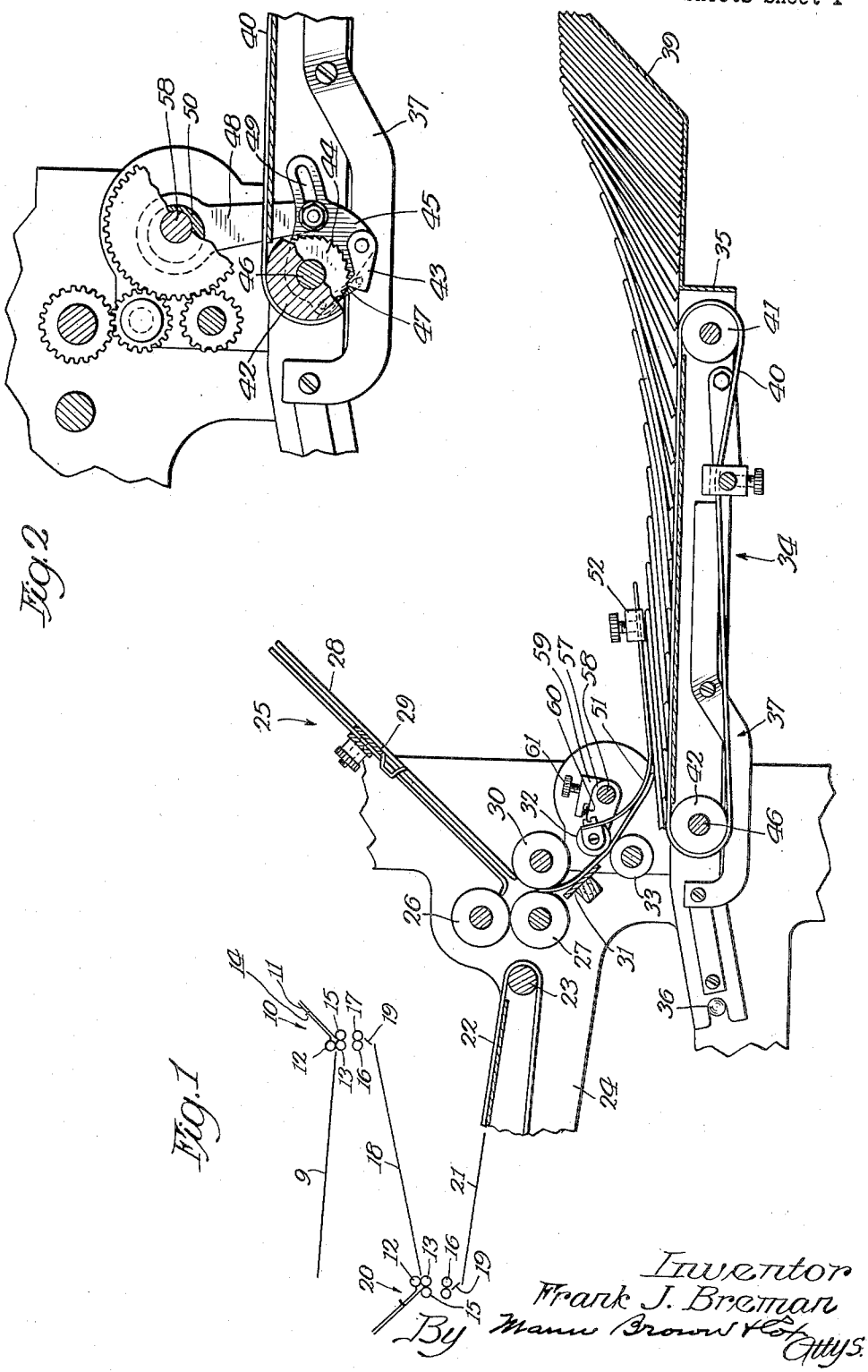


Fig. 2

Fig. 1

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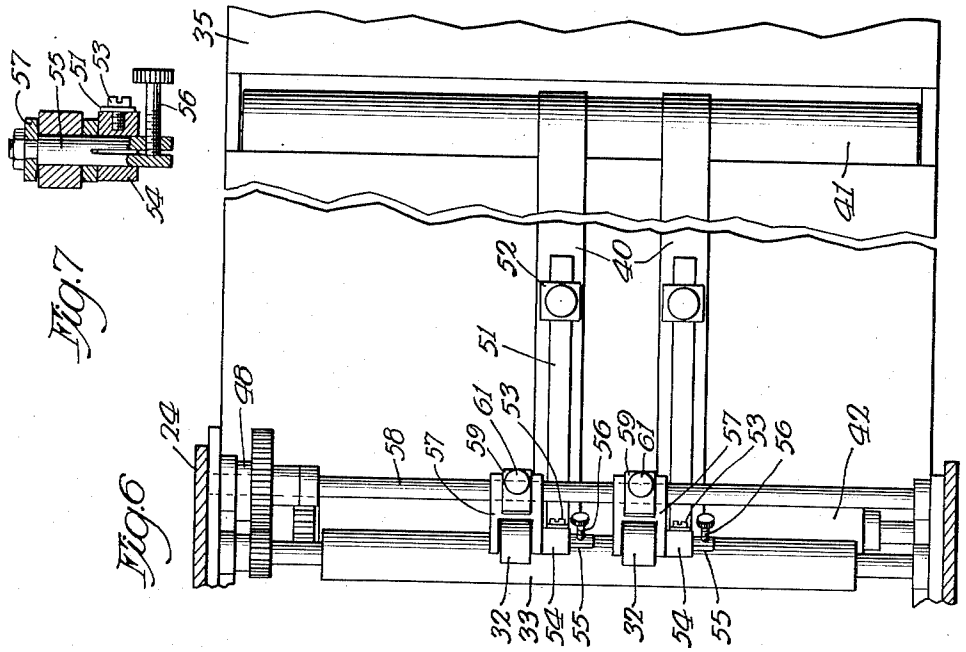


Fig. 7

Fig. 6

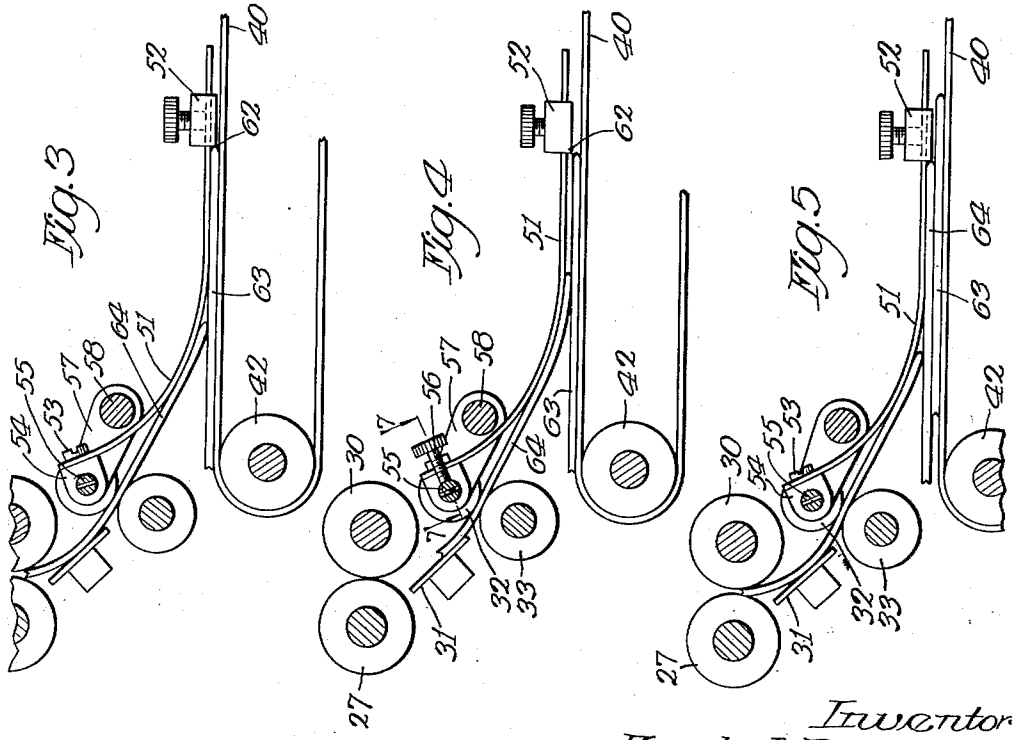


Fig. 3

Fig. 4

Fig. 5

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UNITED STATES PATENT OFFICE

2,238,010

STACKER

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Application May 9, 1938, Serial No. 206,803

18 Claims. (Cl. 271—87)

The principal object of this invention is to provide a simple expedient for insuring that the signatures being delivered to the stacker from a folding machine will always lie in overlapped relation on the stacker. Of course the invention has applicability to many other machines than folding machines and the specific example chosen to illustrate the invention is merely in compliance with Sec. 4888 of the Rev. St.

Further and other objects and advantages will become apparent as the disclosure proceeds and the description is read in conjunction with the accompanying drawings, in which

Fig. 1 is a semi-diagrammatic view of a folding machine equipped with a stacker made in accordance with this invention, the last folding unit of the machine and the stacker itself being shown in more or less detail, while the remainder of the machine is shown diagrammatically;

Fig. 2 is a fragmentary view showing the driving mechanism for the stacker conveyor;

Figs. 3, 4 and 5 illustrate the action of the stacker signature stop by showing successive steps in the feeding of signatures to the stacker;

Fig. 6 is a plan view of the stacker with the intermediate portion broken away; and

Fig. 7 is a detail, sectional view showing the manner in which the arm for the signature stop is adjustably attached to the shaft for the upper ejector roll.

Throughout the specification and the appended claims, the word "signature," although technically meaning a folded sheet, is used in the sense that it may include not only folded sheets, but also any other kind of sheet, as for example box blanks, or the like.

The folding machine chosen to illustrate the invention is of the buckle type, and since this type of machine is well known, it is sufficient to state that it comprises a feed table 9, a first folding unit, generally designated 10, and including a buckle chute 11 to which sheets are fed by rolls 12 and 13 against a stop 14, causing the sheet to buckle and be folded between the rolls 13 and 15, after which the sheet passes between scoring rolls 16 and 17 from whence it is delivered to a conveying table 18 by a deflector 19. The sheet may be turned through an angle of 90° on the table 18 in the manner disclosed in Davidson Patent No. 1,620,444, in which case the subsequent folding unit, generally designated 20 (the parts of which bear reference characters corresponding to those of the folding unit 10) produces a right angle fold after which the sheet is delivered to the lower conveying table 21. If the sheet is not turned on the table 18, a parallel fold is produced in the folding unit 20.

The conveying table 21 is provided with a conveyor belt 22 which travels over a roller 23 journaled between the side frames of the machine, one of which is indicated at 24. Sheets travelling along the table 21 by the action of the belt 22 are delivered to the third folding unit, generally designated 25, which includes feed rolls 26 and 27; a buckle chute 28; an adjustable stop 29 associated with the chute which is adapted, when moved to its lowest position, to deflect the sheets past the chute 28; and a folding roll 30, which cooperates with the roll 27 to fold sheets which are buckled into the bite of these rolls. A deflector 31 then delivers the sheet to ejector rolls 32 and 33, the former or upper roll being a part of the stacker generally designated 34, and the latter or lower roll being mounted on the side frames 24 of the folding machine.

The stacker 34 comprises a frame 35 removably supported on the side frames 24 by a pin and slot device 36 assisted by a latch mechanism, generally designated 37. Since the means for supporting the stacker on the machine is no part of the invention, it need not be further described.

The stacker is provided with a signature conveyor for advancing the signatures toward the rear end 39 of the stacker. The conveyor includes a conveyor belt 40 carried by rolls 41 and 42, the former being an idler roll and the latter being driven in a substantially continuous manner by suitable gearing, or other power transmitting means associated with the folding machine. Since the conveyor belt should have a relatively slow speed, it is convenient to drive it in short intermittent movements by means of a pawl 43 cooperating with a ratchet wheel 44 secured to the roll 42. The pawl 43 is pivotally secured to a rock arm 45 loosely mounted on the shaft 46 of the roll 42 and a spring 47 maintains the pawl in operative engagement with the ratchet wheel. The rock arm 45 is oscillated by means of a link 48 connected at its lower end to the arm 45 by a pin and slot device 49 which permits the length of the conveyor drive to be varied, the upper end of the link 48 being mounted on an eccentric bearing 50 associated with one of the gear trains which drives the feed and folding rollers 26, 27 and 30 and the lower ejecting roller 33.

Since the operation of the stacker conveyor is continuous, i. e. it continues its movement even though the folding machine is stopped, it is obvious that the signatures will not be piled in overlapping relationship in the event the pro-

gression is stopped or delayed unless suitable means are provided to insure this result.

In the present invention, the desired result is achieved by an extremely simple device comprising a highly flexible resilient leaf spring or arm 51 carrying an adjustable signature stop 52 at its rear end, and being connected by a screw 53 at its other end to a collar 54 which is loosely mounted on the pin or shaft 55 which carries the upper ejector roll 32. The shaft 55 is split at its end (see Fig. 7) and has one of its halves drilled and tapped to receive a thumb screw 56 which when tightened spreads the split end of the shaft 55 and clamps the collar 54 in the desired angular position.

The shaft or pin 55 for the upper ejector roll 32 is trunnioned in a jaw 57 which is loosely mounted on a shaft 58 extending between the side frames of the machine. An adjustable block 59 which may be clamped to the shaft 58 in any desired angular position, urges the upper ejector roll against the lower ejector roll through the action of a compression spring 60. The pressure exerted by the upper ejector roll 32 on the lower roll can be adjusted by unscrewing the thumb nut 61 associated with the block 59, and then rotating the block to the left, or to the right, depending upon whether more or less pressure is desired.

The action of the signature stop 52 is as follows: (see Figs. 3, 4 and 5): The stop forms a shoulder 62 which always prevents at least one signature from travelling beyond the stop to the rear of the stacker, and preferably the shoulder has a depth which is slightly less than the thickness of the signature so that only one signature will remain at the stop. The stop is adjustable along the spring arm 51 so that the signature 63 held back by the stop (even though the stacker conveyor continues to run) is in such position that when the next signature 64 is conveyed to the stacker by the ejector rolls 32 and 33, its forward edge will strike the upper surface of the signature 63 and be guided between the arm 51 and the signature 63, as shown in Fig. 3. The ejector rolls 32 and 33 drive the signature 64 to the rear and the signature 64 acts as a wedge to raise the arm 51 a sufficient distance (Fig. 4) to permit the lower signature 63 to be advanced by the belt 40. When the signatures are being fed to the stacker at regular intervals, the arm 51 is raised to the position shown in Fig. 1 and sometimes higher, but if at any time the feeding of signatures to the stacker is stopped while the conveyor belt 40 continues its travel, the signatures under the stop 52 will all move to the rear of the stacker by the action of the belt leaving a single signature abutting the shoulder 62 so that when the feeding of signatures to the stacker is resumed, the next signature will be in overlapping relationship to the signature held back by the stop 52.

After there has been a break in continuity in the feeding of signatures to the stacker as described above, there is no particular problem involved when the second batch of signatures catch up with the previously stacked signatures, since the upturned end 39 of the stacker causes the sheets to take an angle such that the second batch of signatures will readily overlap with and become continuously stacked with the first batch of signatures. Even if this were not so, it would make little difference because the second batch of signatures would be in overlapped position and it would make little difference if only two signatures failed to be properly overlapped.

Preferably, two conveyor belts are used on the stacker as shown in Fig. 6 with a spring arm and adjustable stop over each belt. Obviously various modifications can be made in the mounting of the arm 51 and stop 52 without departing from the spirit of the invention.

I claim:

1. In combination, a stacker including a continuously operating conveyor for advancing signatures or the like along the stacker, means for delivering signatures to the conveyor in overlapped relation even though said means is delivering signatures to the stacker at irregular intervals, said means comprising a spring arm having its outer end resiliently urged under flexure toward the conveyor, a stop carried by the arm said stop projecting toward the conveyor by an amount which is less than the thickness of a single signature and means for varying the pressure exerted by the arm upon the signature at a point removed from the stop.

2. In combination, a stacker including a continuously operating conveyor for advancing signatures or the like along the stacker, means for delivering signatures to the conveyor in overlapped relation even though said means is delivering signatures to the stacker at irregular intervals, said means comprising a spring arm having its outer end resiliently urged under flexure toward the conveyor and adapted over a substantial portion thereof to contact the upper face of a signature therebelow in parallel relationship therewith, and a stop carried by the arm, said stop being adjustable along the arm.

3. In combination, a stacker including a continuously operating conveyor for advancing signatures or the like along the stacker, means for delivering signatures to the conveyor in overlapped relation even though said means is delivering signatures to the stacker at irregular intervals, said means comprising a spring arm having its outer end resiliently urged under flexure toward the conveyor, and a stop carried by the spring arm.

4. In combination, a stacker including a continuously operating conveyor for advancing signatures or the like along the stacker, means for delivering signatures to the conveyor in overlapped relation even though said means is delivering signatures to the stacker at irregular intervals, said means comprising a mounting member, an arm secured to the mounting member and projecting rearwardly over the conveyor and variable angularly therewith, a stop carried by the arm and movable on the arm independently of the mounting member, and adjustable spring means engaging the mounting member for urging the arm toward the conveyor and into contact with a signature on the conveyor.

5. In combination, a stacker including a continuously operating conveyor for advancing signatures or the like along the stacker, means for delivering signatures to the conveyor in overlapped relation even though said means is delivering signatures to the stacker at irregular intervals, said means comprising a shaft, a collar mounted on the shaft, a flexible arm rigidly attached to the collar and projecting rearwardly over the conveyor, a stop carried by the arm, and means for adjustably clamping the collar to the shaft whereby the arm is resiliently urged toward the conveyor with the desired force.

6. In combination, a stacker including a continuously operating conveyor for advancing signatures or the like along the stacker, means for

delivering signatures to the conveyor in overlapped relation even though said means is delivering signatures to the stacker at irregular intervals, said means comprising a leaf spring having its inner end supported in such manner that the free end is resiliently urged toward the conveyor, and a signature stop carried by the spring.

7. In a stacker, the combination of an ejector roller, a conveyor removing signatures from the roller, a stop of a thickness approximately that of a single signature spaced from the roller, and spring means angularly movable under flexure with variations in the thickness of overlapped signatures for contacting the top signature flat against the upper face thereof and supporting the stop.

8. In combination with a stacker having a conveyor and a device depositing a signature upon the conveyor under positive drive, a resilient arm constructed and arranged over a portion of its length to lie flat against the face of a top signature disposed therebelow and stop means for inhibiting movement of a signature with which the arm is in contact.

9. In combination with a stacker having a conveyor and an ejecting device for depositing signatures upon the conveyor wherein the ejecting operation continues for a time after the signatures make initial contact with the conveyor, an arm resiliently urged towards the conveyor, a second arm carried by the first and yielding under flexure to assume the plane of the topmost signature inserted thereunder as the signatures are superimposed one upon the other on the conveyor by the ejecting device, and stop means on the second arm inhibiting movement of a signature with which the last arm is in contact.

10. In combination with a conveyor and an ejecting device for depositing signatures upon the conveyor, an arm carried by the ejecting device yieldingly engaging and following under flexure the contour of a signature thereunder over a substantial portion of the upper face thereof, and stop means for inhibiting movement of a signature so engaged by said arm, the ejecting device and arm being so constructed and arranged that each successive signature deposited by the device upon the conveyor is positively driven between the signature inhibited by the stop and the arm an appreciable distance whereby each successive signature is brought into contact with the stop means under conveyor movement and each preceding signature is released by the stop means.

11. In combination with a conveyor receiving signatures in overlapped relation, a stop shoulder means for inhibiting movement of the topmost signature by the conveyor, and spring means subject to flexure for carrying and maintaining said shoulder normal to the plane of the topmost signature.

12. In combination, a stacker including a continuously operating conveyor for advancing signatures or the like along the stacker, means for delivering signatures to the conveyor in overlapped relation even though said means is delivering signatures to the stacker at irregular intervals, said means comprising a spring arm having its outer end resiliently urged against a signature supported on the conveyor and flexing with the thickness of signatures under it, means for varying the pressure exerted by the arm upon the signature, and a signature stop on the arm.

13. In combination, a stacker including a continuously operating conveyor for advancing signatures or the like along the stacker, means for delivering signatures to the conveyor in overlapped relation even though said means is delivering signatures to the stacker at irregular intervals, said means comprising a flexible arm extending in the direction of conveyor movement with its outer end resiliently urged against a signature supported on the conveyor, means for varying the pressure the arm exerts upon the signatures and a stop on the arm obstructing conveyor movement of the top signature under the arm.

14. In combination, a stacker including a continuously operating conveyor for advancing signatures or the like along the stacker including one of a pair of ejector rollers, means for delivering signatures to the conveyor in overlapped relation even though said means is delivering signatures at irregular intervals, said means comprising an arm supporting said one ejector roller, means resiliently urging the roller and said arm towards the conveyor, a second arm mounted on the first arm and projecting rearwardly over the conveyor, and a stop carried by said second arm.

15. In combination, a stacker including a continuously operating conveyor for advancing signatures or the like along the stacker including one of a pair of ejector rollers, means for delivering signatures to the conveyor in overlapped relation even though said means is delivering signatures at irregular intervals, said means comprising an arm supporting said one ejector roller, means resiliently urging the roller and said arm towards the conveyor, a second arm mounted on the first arm and projecting rearwardly over the conveyor, and means for bringing the second arm into contact with the conveyor and varying the pressure with which the second arm contacts the conveyor.

16. In combination, a stacker including a continuously operating conveyor for advancing signatures or the like along the stacker, means for delivering signatures to the conveyor in overlapped relation even though said means is delivering signatures to the stacker at irregular intervals, said means comprising a spring arm having its outer end resiliently urged under flexure toward the conveyor, a stop carried by the spring arm, and means for adjusting the pressure exerted by the arm toward the conveyor.

17. In combination, a stacker including a continuously operating conveyor for advancing signatures or the like along the stacker, means for delivering signatures to the conveyor in overlapped relation even though said means is delivering signatures to the stacker at irregular intervals, said means comprising a spring arm having its outer end resiliently urged under flexure toward the conveyor, a stop carried by the arm and adjustable longitudinally of the conveyor.

18. In combination, a stacker including a continuously operating conveyor for advancing signatures or the like along the stacker, means for delivering signatures to the conveyor in overlapped relation even though said means is delivering signatures to the stacker at irregular intervals, said means comprising a spring arm having its outer end resiliently urged under flexure toward the conveyor, a stop carried by the arm and adjustable longitudinally of the conveyor, and means for varying the pressure exerted by the arm toward the conveyor.

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