

April 8, 1941.

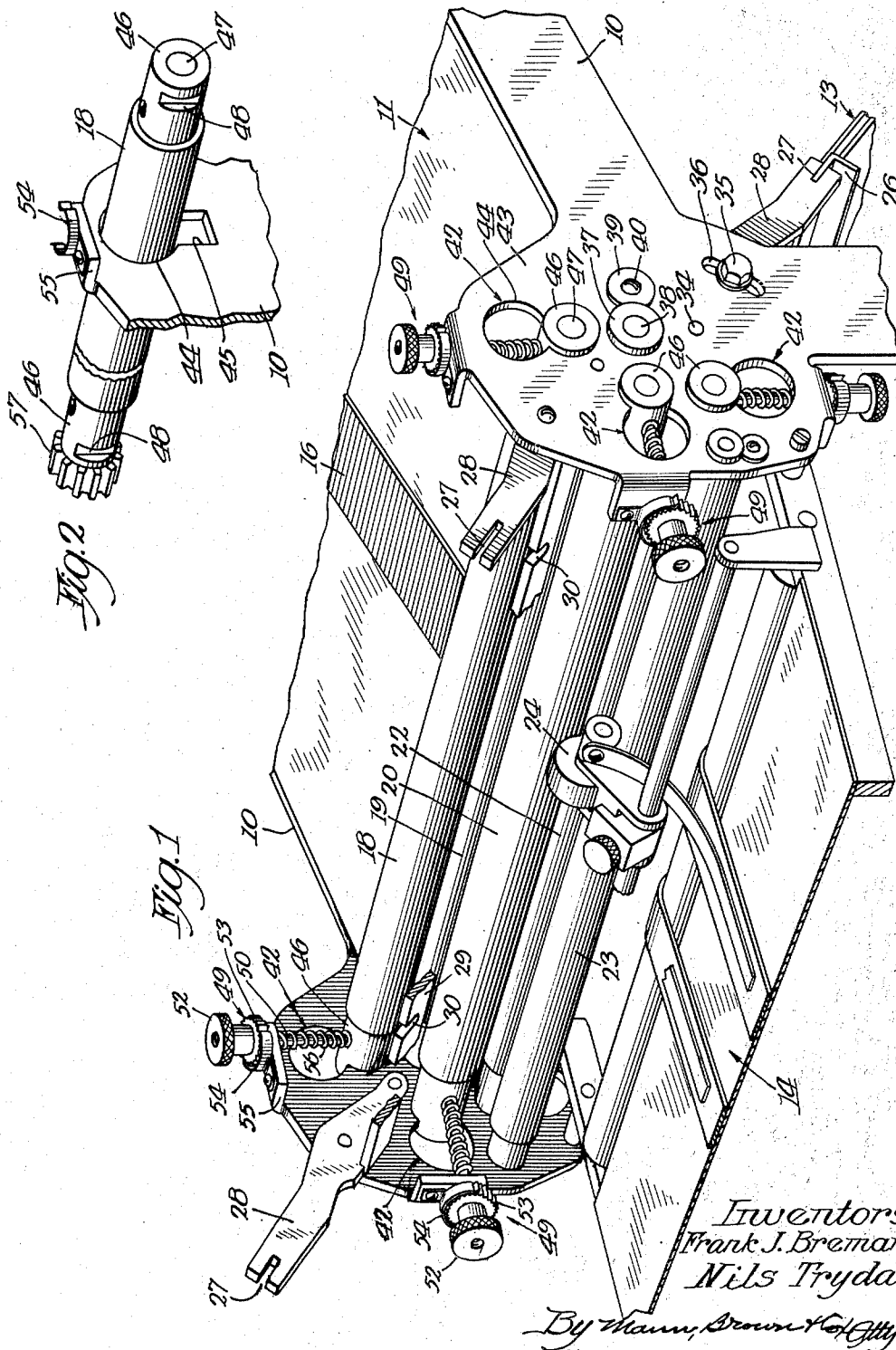
F. J. BREMAN ET AL

2,238,009

FOLDING MACHINE

Filed May 2, 1938

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

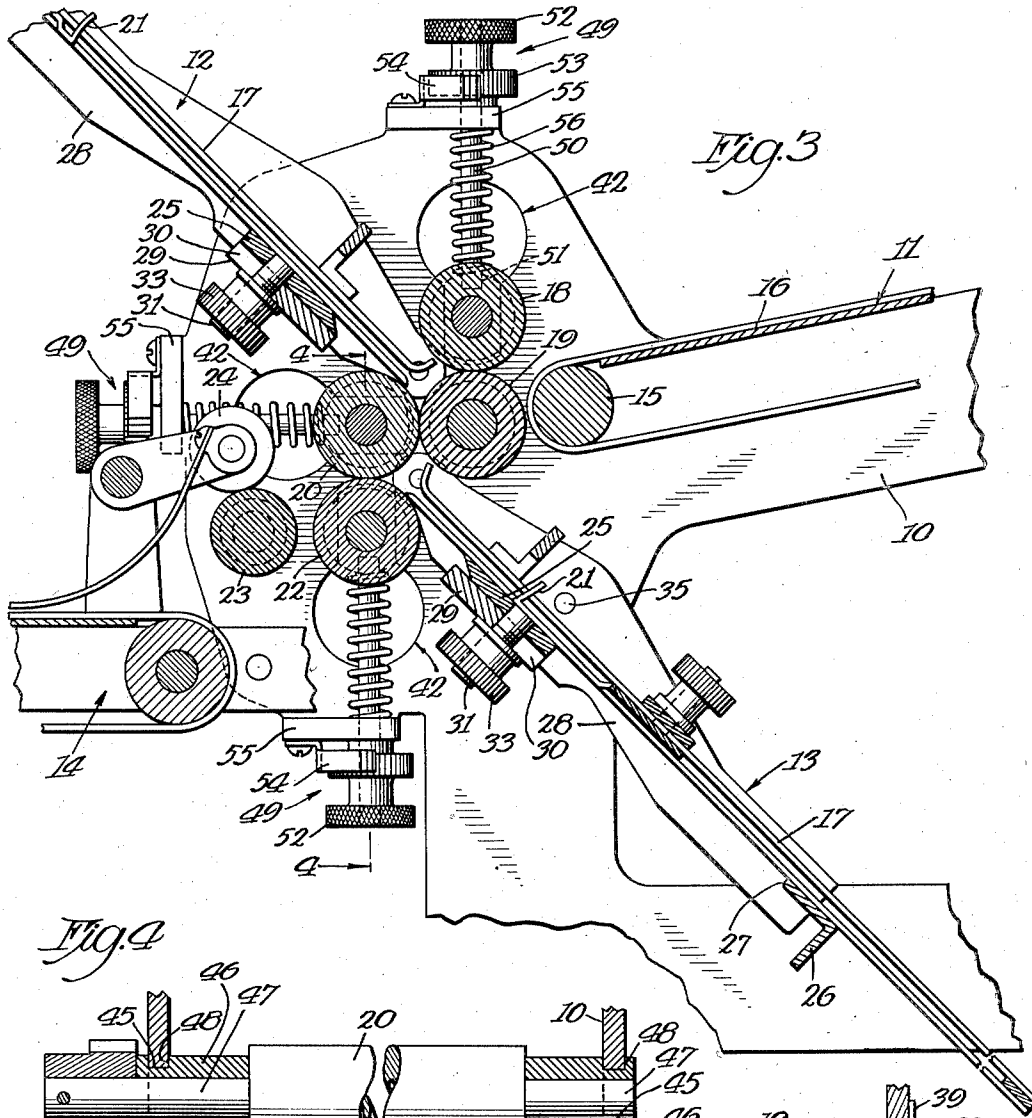
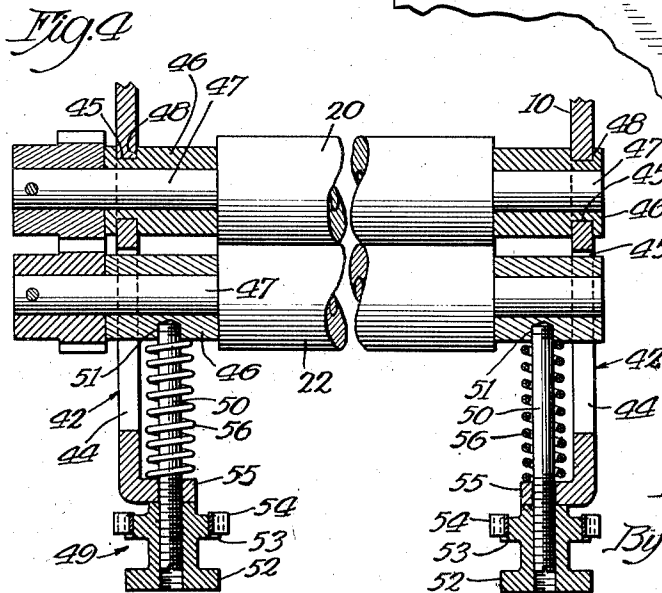
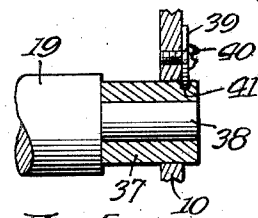


Fig. 5

Inventors
Frank J. Brennan
Nils Trydal

Frank J. Brennan

Nils Trydal

By Mary Brown & Co

Etty's.

UNITED STATES PATENT OFFICE

2,238,009

FOLDING MACHINE

Frank J. Breman, Oak Park, and Nils Trydal, Chicago, Ill., assignors to Davidson Manufacturing Company, a corporation of Wisconsin

Application May 2, 1938, Serial No. 205,561

3 Claims. (Cl. 270-68)

The principal object of this invention is to provide a simple and inexpensive arrangement for mounting the folding rolls and buckle chutes of a folding machine, the arrangement being such that all necessary adjustments can be quickly and accurately made, and such that replacement of rollers and chutes is greatly facilitated.

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 diagrammatic view showing the application of this invention to a multiple unit folder;

Fig. 2 is a fragmentary perspective view showing the manner in which the folding rolls are removed through the keyhole slots in the side frames;

Fig. 3 is a vertical sectional view through the folding mechanism;

Fig. 4 is a sectional view taken on the line 4-4 of Fig. 3, with intermediate portions of the folding rolls broken away; and

Fig. 5 is a fragmentary detail view showing the manner in which the relatively fixed rolls are supported in the side frames.

A preferred form of the invention has been chosen for illustration and description, but it should be understood that the invention is capable of many modifications and variations within the scope of the appended claims.

A portion of a folding machine is shown in Fig. 1, comprising side frames 10, a conveyor board 11, folding units, generally designated 12 and 13, and a stacker, generally designated 14. The conveyor board includes a tape roller 15, over which a conveying tape 16 travels to deliver sheets to be folded to the first folding unit 12.

The folding unit 12 comprises a buckle chute 17 and rolls 18, 19 and 20, the first two serving as feed rolls to deliver sheets in a well known manner against an adjustable stop 21 in the buckle chute 17, and the rolls 19 and 20 serving as folding rolls to produce the first fold in the sheet.

The rolls 19, 20, also serve as feed rolls for the second folding unit 13, and when the sheet strikes the adjustable stop 21 in this unit the sheet is buckled between the rolls 20 and 22 to form the second fold. The twice folded sheet is then delivered to the stacker 14 by ejector rolls 23, 24, the former, being a steel roller, carried by the side frames 10, and the latter, being a rubber roller, which constitutes a part of the stacker 14.

Each of the buckle chutes is of more or less

conventional construction, but in addition is provided with a lower transverse reinforcement 25 and an upper cross angle 26, the ends of the latter being adapted to rest within slots 27, formed in arms 28 attached to the side frames 10. The arms 28 are connected by a cross-bar 29, having a plurality of slots 30 adapted to receive threaded studs 31, which are screwed into the adjacent reinforcement 25 of the buckle chute. When the buckle chute is in place the reinforcement 25 rests upon the cross-bar 29, and the cross angle 26 engages the slot 27, and this position of the buckle chute is rigidly maintained by thumb-screws 33 which clamp the buckle chute in place. By loosening the screws 33 the chute can be quickly removed.

The buckle chute associated with the second folding unit 13 is preferably mounted so that it is angularly adjustable, this function being readily accomplished by pivoting the arms 28 associated with this folding unit at 34 on the side frames 10, and allowing clamping studs 35, which screw into the arms 28, to travel in arcuate slots 36 in the side frames.

The rolls 18, 19, 20 and 22 are preferably made of rubber, and it is desirable that they should be readily removable in order that they may be replaced when worn. In addition, it is necessary that the rolls 18, 20 and 22 be adjustable with respect to their associated rolls in order to take up for wear, and accommodate sheets of different thickness.

The roll 19 may be rotatably supported in the side frames by means of a sleeve bearing 37, which telescopes over the trunnion bearing 38 of the roll and is held in place with respect to the side frames by a washer 39 (Fig. 5), secured to the frame by a screw 40, and having a portion fitting within a slot 41 formed in the sleeve bearing 37. When the screw 40 is removed and the washer 39 slipped from the slot 41, the bearing 37 can be easily removed from the trunnion bearing 38, and there is sufficient play between each of the trunnion bearings 38 and the bearing openings in the side frames 10 so that the roll 19 can easily be removed by tilting it to one side and lifting it from the top of the machine (assuming that the other rolls have been removed).

The rolls 18, 20 and 22 are supported in a novel bearing arrangement which not only facilitates removal of the rolls as a whole but also permits them to be adjustably positioned with the rolls with which they are associated. Keyhole slots, generally designated 42, are stamped in the enlarged end portions 43 of the side frames 10

(preferably the entire side frame is stamped from a single piece of material), and these slots are arranged so that their narrow portions face inwardly. The keyhole slots associated with the rolls 18 and 20 are in alignment with the axis of the roll 19, and the keyhole slot associated with the roll 22 is in alignment with the axis of the roll 20.

Each of the keyhole slots comprises an enlarged portion 44, of sufficient size that the roll can be passed longitudinally through this portion of the slot, as indicated in Fig. 2. Since the driving gears for the rollers are on the far side of the machine as viewed in Fig. 1, the rolls would normally be removed to the left in that figure (see also Fig. 2).

The narrow portion 45 of the keyhole slots forms a guideway for the sleeve bearing 46, which is telescoped over each of the trunnion bearings 47 of the folding rolls, the sleeve bearing 46 being slotted on opposite sides, as best shown at 48 in Fig. 4, so that the bearing is held against rotation in the slot and yet is capable of movement toward and away from the adjacent roll.

The positioning of the bearing 46 within the slot 48 is accomplished by a slow motion device, generally designated 49, which comprises a stud 50 screwed into the bearing, as indicated at 51, and provided at its upper end with a thumb-screw 52 and a micrometer attachment consisting of a notched wheel 53, cooperating with a spring pawl or dog 54. The stud 50 projects through a lug 55 integral with the side frame 10, and a spring 56, telescoped over the stud 50, yieldingly holds the bearing in the position determined by the setting of the thumb-screw 52.

To remove either one of the rolls 18, 20 or 22, all that is necessary is to unscrew the stud 50 from the sleeve bearing 46 and lift the stud from the lug 55, after which the springs 56 may be removed, so that the entire roll, with its associated sleeve bearings, can be raised into alignment with the enlarged opening 44 of the keyhole slot and then shifted endwise through the side frames, as shown in Fig. 2.

Preferably the rolls 18, 19, 20 and 22 are all positively driven by a train of gears, one of which is indicated at 57 in Fig. 2. The lower ejector roll 23 is also positively driven, although in this case it is convenient to use a belt drive instead of gears.

If desired the roll 19 may be made of metal, so that it will very seldom require removal. However, even when it is made of rubber it is not difficult to remove the roll, because the conventional practice is to replace all of the folding rolls at one time, and when the rolls 18, 20 and 22 have been removed it is a very simple matter to remove the roll 19.

We claim as our invention—

1. In a folding machine, a pair of side frames, a plurality of folding rollers mounted between and supported by the side frames, a buckle chute, and means for removably supporting the buckle chute in cooperative relation with the folding rollers, said means comprising slotted arms projecting from the side frames, a cross-bar connecting the arms and provided with a plurality of slots, a cross angle constituting a part of the buckle chute having end portions engaging the slots in the projecting arms, and thumb-screws having their shanks entering the slots of the cross-bar whereby the chute may be rigidly supported in place on the bar when it is being used or can be quickly removed by loosening the thumb-screws and moving the chute outwardly.

2. In a folding machine, a pair of side frames, a plurality of folding rollers mounted between and supported by the side frames, a buckle chute, and means for removably supporting the buckle chute in cooperative relation with the folding rollers, said means comprising arm members projecting from the side frames having portions formed to interfit with portions of the buckle chute and members cooperating with said arm members and forming part of the buckle chute, one of the respective members having a slot and the other having a securing device provided with a shank entering said slot, whereby tightening of the securing device will hold said interfitting portions together and loosening thereof will permit the members to be separated.

3. In a folding machine, spaced side frames having oppositely aligned slots therein each including a narrow portion and a communicating wider portion, a folding roller having end trunnions each having a sleeve bearing provided with opposite grooves receiving the narrow portion of one of said slots, and means for mounting each of said sleeve bearings in said narrow portions of the slots adapted to permit the roller to be removed from the side frames or adjusted therein relatively to a cooperating roller without removing either of the side frames, said means comprising a stud carried by the sleeve bearing and detachable therefrom, a lug formed on the side frame and adjustably mounting said stud, and spring means reacting between the lug and the sleeve bearing to resiliently hold the sleeve bearing in adjusted position in the narrow portion of the slot, said lug being mounted on the side frame in alignment with the slot therein and beyond the wider portion thereof so as not to interfere with removal of the roller through said wider portion when the stud is removed.

FRANK J. BREMAN.
NILS TRYDAL.