

Jan. 22, 1963

E. OLSON

3,074,710

TABLOID FOLDING MACHINE

Filed June 2, 1959

3 Sheets-Sheet 1

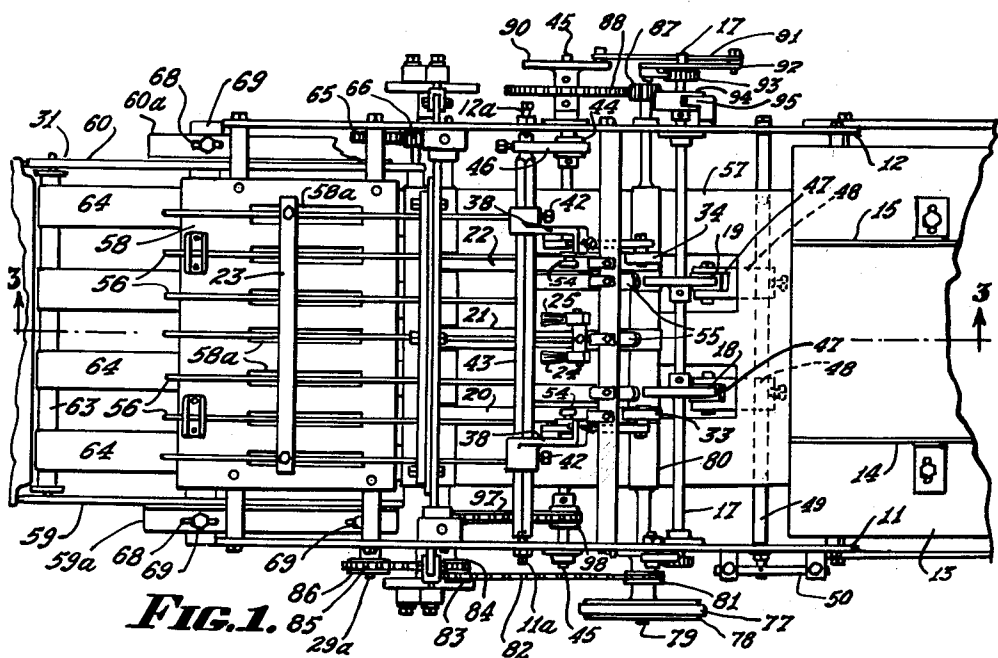


FIG. 1.

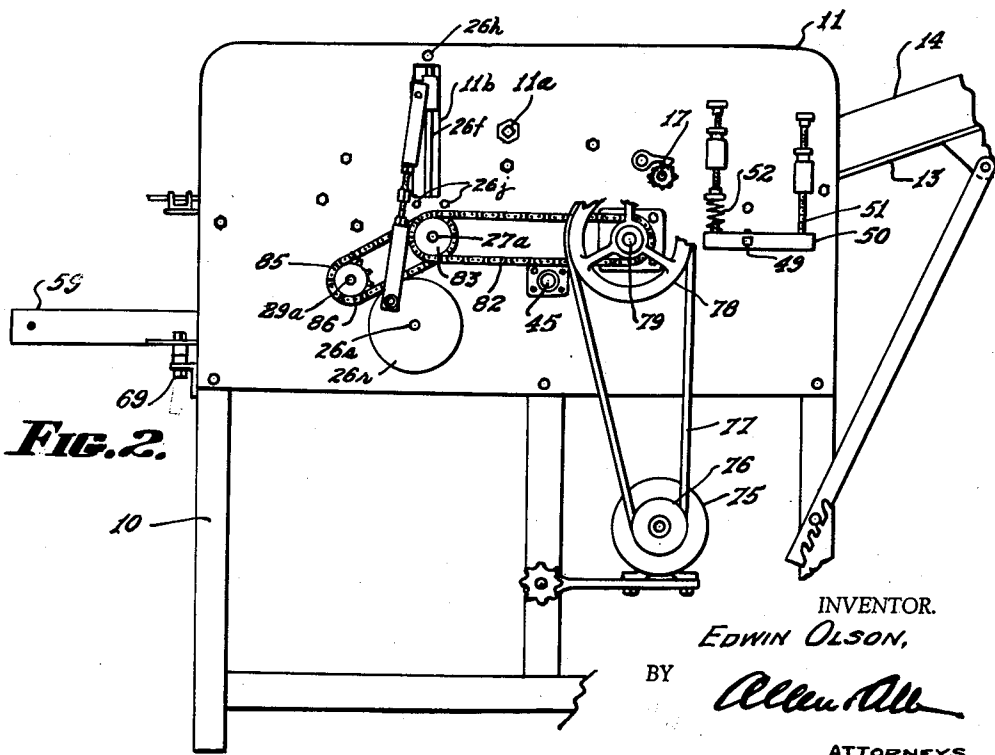


FIG. 2.

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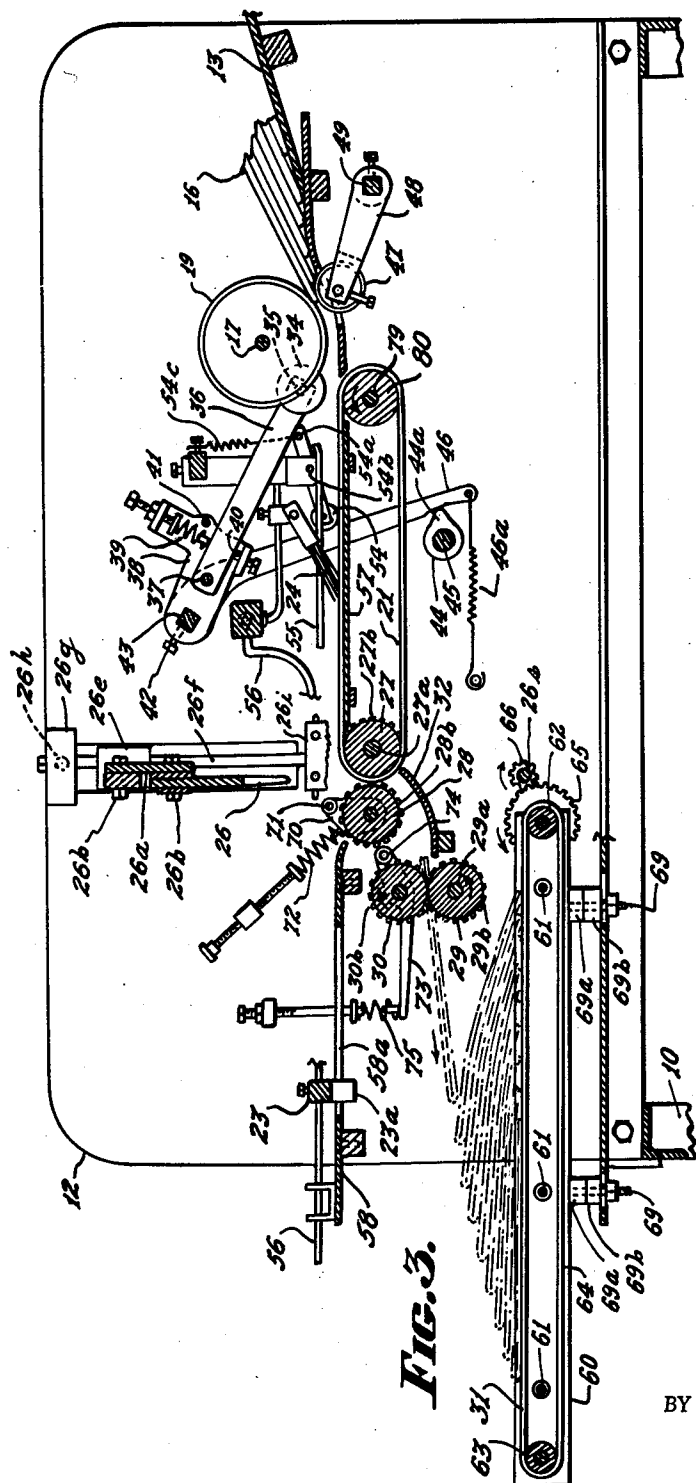


FIG. 3.

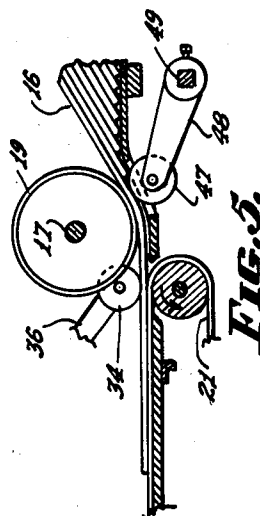


FIG. 5.

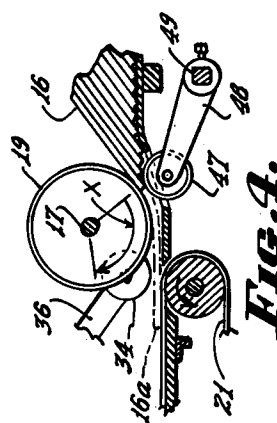


FIG. 4.

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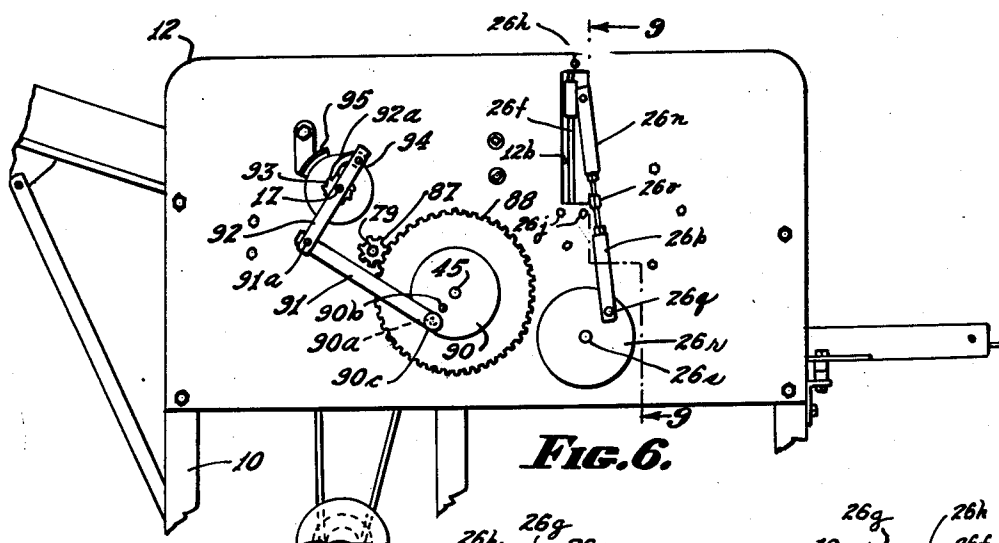


FIG. 6.

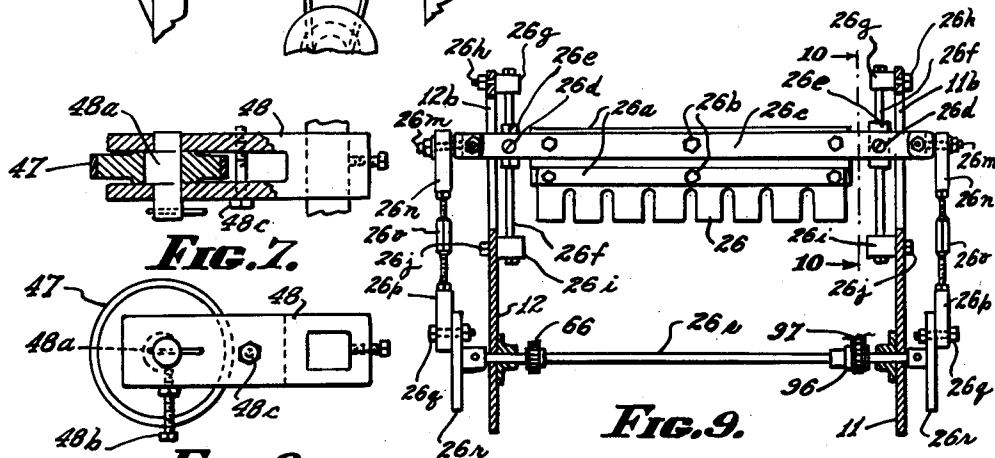


FIG. 7.

FIG. 8.

FIG. 9.

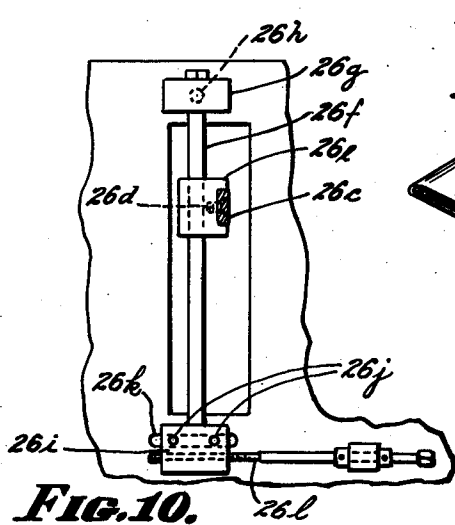


FIG. 10.

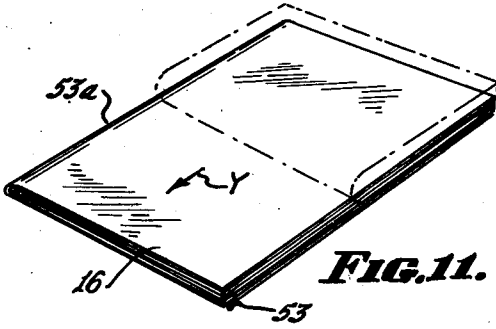


FIG. 11.

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3,074,710

TABLOID FOLDING MACHINE

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4 Claims. (Cl. 270—83)

My invention relates to improvements in tabloid folding machines and more particularly to a blade type folding mechanism especially provided for imparting an additional line of fold to previously prepared tabloids, time-tables or similar articles comprising a plurality of printed sheets assembled and once folded.

An object of my invention is to provide an improved arrangement of parts comprising means for feeding and advancing tabloids or booklets to a folding blade, the arrangement being advantageous in that the workpieces are withdrawn from a pile and advanced against an end stop more squarely permitting higher rates of production.

Another object of my invention is to provide improved mountings and adjustments for the reciprocating blade whereby adjustment thereof for various conditions may be more readily accomplished.

Another object of my invention is to provide feed belts underlying a work piece with specially timed mechanism for intermittently pressing down against a work piece to cause its movement to a position with its median line underlying a buckle folding knife and its front edge against an adjustable stop, the mechanism being timed for reciprocation of the buckle folding knife at the instant of the work piece engaging the stop.

Other objects and advantages of my invention will become apparent to those skilled in the art upon an understanding of the ensuing description taken in conjunction with the appended drawings wherein like reference numerals refer to like parts throughout the various views thereof, and wherein

FIGURE 1 is a plan view showing an arrangement of parts in accordance with my invention.

FIGURE 2 is a front elevational view thereof.

FIGURE 3 is a vertical and enlarged sectional view taken along the line 3—3 of FIGURE 1.

FIGURE 4 is a fragmentary detail view illustrating operation of my improved feeding mechanism.

FIGURE 5 is a similar view showing an alternate position of parts.

FIGURE 6 is an elevational view of the machine showing the side opposite to that of FIGURE 1.

FIGURE 7 is a detailed plan view partly in section showing a retarding member.

FIGURE 8 is a side view of FIGURE 7.

FIGURE 9 is a vertical sectional view taken along the line 9—9 of FIGURE 6 but having certain parts omitted to more clearly show details of the folding blade and the mounting therefor.

FIGURE 10 is a sectional view taken along the line 10—10 of FIGURE 9, and

FIGURE 11 is a perspective view illustrating a tabloid or the like and showing in broken lines an additional fold imparted thereto for convenience in ultimate distribution.

With reference first to FIGURES 1 and 2 of the drawings, the machine shown briefly comprises a suitable framework 10 mounting a pair of vertically arranged and spaced side plates 11 and 12. An inclined feedboard 13 has upstanding side guides or plates 14 and 15 for receiving a quantity or stack of workpieces in combed relation as indicated at 16.

Still briefly, a shaft 17 suitably journaled between the side plates 11 and 12 mounts a pair of frictionally surfaced feed wheels 18 and 19, which feed wheels, by ratchets means as will later be more clear, are intermit-

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tently advanced or rotated through a fractional portion only of a full rotation. During this movement the feed wheels advance a workpiece from the feedboard to a forward position where by means including belts 20, 21 and 22, the workpiece is farther advanced until its leading edge abuts the stop element indicated at 23. As this occurs, the brushes 24 and 25, bearing lightly upon the workpiece, prevent back lash or bouncing back from the stop member and the piece is properly positioned in readiness for the ensuing folding operation.

Still briefly but with reference now to FIGURE 3, and with the workpiece not herein shown but thus in position abutting the stop 23, the workpiece is centrally positioned beneath a vertically reciprocating blade 26 and above a pair of driven rolls 27 and 28. Assuming that arrival of the workpiece at this position is properly timed, the blade 26 is moving downwardly and engages the workpiece to initiate forming a new and central line of fold while introducing this newly initiated line of fold into the bite of the driven rolls 27 and 28 which serve to initially crease the new fold line and thereafter to advance the newly folded edge into supplementary or secondary creasing rolls 29 and 30 which improve the creasing action and discharge the workpiece onto a receiving conveyor 31, a deflector or curved guide plate 32 being arranged to direct the workpiece into the bite of the rolls 29 and 30.

Proper timed advancement of each workpiece into position beneath the blade 26 is controlled by my improved feeding arrangement wherein as shown (FIGS. 1 and 3) each of the feed wheels 18 and 19 have smaller and co-acting feed wheels or rolls respectively indicated at 33 and 34, which as shown, are located adjacent the said feed rolls and above the continuously running belts 20 and 22.

Each of the rolls 33 and 34 as perhaps best seen in FIGURE 3, is rotatably mounted as by means of a stud 35 on the outer end of a lever arm 36 pivotally connected as at 37 to a shorter lever 38 having a spring 39 arranged as shown to resiliently urge the lever 36 downward against an adjustable abutment comprising a screw 40. Upward movement of the lever 36, about its pivot 37 being limited as by a pin 41, it will be clear that lever 36 may rock slightly with respect to the lever 38, the spring 39 serving to cushion the movement.

Each of the rolls 33 and 34 hereinafter also referred to as "drop rolls" because of their mode of operation, or as "secondary feed rolls" because of their function, are thus arranged upon levers 38 which in turn are affixed as by screws 42 to a bar 43 extending between the side plates 11 and 12 and trunnioned therebetween by suitably cone pointed screws 11a and 12a (FIG. 1). The bar 43 is thus adapted for rocking movements whereby the drop rolls 33 and 34 may be lifted from or lowered into contact with workpieces advanced into position beneath the rolls by the intermittent rotation of feed wheels 18 and 19. Lifting and lowering of the drop rolls is accomplished in timed relation with movements of other parts by means of a cam 44 having a rise 44a and adjustably repositionable by means of a set screw 44b upon a shaft 45 driver as will be later described, the cam 44 serving to actuate a lever 46 fixed to the trunnioned bar 43 and being urged by tension spring 46a in clockwise rotation as seen in FIGURE 3 whereby the rolls 33 and 34 are resiliently urged toward contact with workpieces passing therebeneath.

With reference now to FIGURES 1 through 5, each of the feed wheels 18, 19 have a coacting retarding member shown as comprising a frictionally surfaced roll 47 non-rotatably mounted on a lever 48 fixed to a bar 49, which is arranged for rocking movements between the side plates 11 and 12, there being two of the levers 48. The bar 49 extends outwardly through the plate 11 and fixedly mounts a lever 50, one end of which engages an

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adjustable abutment comprising a screw 51 while the other end is engaged by a compression spring 52. Thus the position and pressure of both retarding members with respect to the feed wheels may be simultaneously and conveniently adjusted during operation of the machine. However, as shown in FIGURES 7 and 8 at least one of the levers 48 may be provided with an eccentric pin 48a mounting the retarder 47. Thus by rotation of the pin 48a the relation of the retarder may be adjusted, the pin thereupon being locked in position by a set screw 48b while the lever 48 may be bifurcated as shown, to permit locking the member 47 in adjusted relation by means such as a clamping screw 48c which draws the bifurcated fingers tightly against the member 47. This individual adjustment permits compensation as may be required. Thus in FIGURE 11 the tabloid 16 as shown comprises an assembly of sheets 53 folded on the side 53a. It being necessary to advance the tabloid in the direction as indicated by the arrow Y, the retarding members may be adjusted to compensate for the slightly increased thickness due to reaction of the folded paper, along the margin of the folded edge.

With reference to FIGURE 4 the feeding operation is as follows: In timed relation with movement of the blade 26 the feed wheels 18 and 19 rotate through an arc as indicated by the arrow X thereby advancing the leading edge 16a of a workpiece to the position indicated by broken lines. As this occurs the drop rolls 33 and 34 are in the lifted position of FIGURE 4 and the tabloid or workpiece ceases to advance farther until, as seen in FIGURE 5, the rolls 34 are permitted to drop downward into contact with and pressing the workpiece against the moving belts the tabloid again advances until its leading edge strikes the abutment 23. The timing or instant of contact of the drop rolls makes allowance for various factors including speed of the belts 20, 21, 22, weight and sizes of the workpieces and movements of the blade 26.

During the final portion of the forward movement the tabloids are lightly pressed against the moving belts by small rollers such as indicated at 54 in FIGURE 3, the rollers 54 being mounted on one end of a lever 54a pivotally supported as at 54b, and engaged on its other end by a light extension spring 54c. During forward movement of the tabloids suitable hold down bars generally indicated at 55, and other hold down rods generally indicated at 56 are employed. The belts 21, 22 and 23 operate over a suitable supporting plate 57 while the leading ends of the tabloids, prior to folding, are supported on a plate 58 slotted as at 58a to accommodate downwardly extending fingers 23a of the stop member 23.

Due to the feeding arrangement comprising dual and interspaced feed wheels and elements coacting therewith, the workpieces are advanced squarely against the stop element in an improved and balanced manner permitting increased rates of operation.

With reference now to FIGURE 9, the blade 26 is affixed as by suitable plates 26a and bolts 26b to a bar 26c which extends outwardly through slots 11b and 12b respectively provided in the side plates 11 and 12. The bar 26c near its opposite ends, has screws 26d affixing blocks 26e which are slidably arranged on guide rods 26f. At their upper ends the guide rods are affixed to blocks 26g which in turn are each held to the side plates by a single screw 26h. At their lower ends the guide rods are affixed to blocks 26i which in turn are held to the side plates by screws 26j which pass through oversize holes 26k (FIG. 10), in the side plates. Thus by inspection of FIGURE 10 it will be clear that the vertical alignment of the guide rods may readily be altered as required for workpieces of different thicknesses, thus permitting adjustment of the lower edge of the blade with respect to its relation between the rolls 27 and 28. By loosening the lower screws 26j the lower ends of the

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guide rods may be moved with respect to a pivot point comprising the upper screw 26h. For convenience in adjusting the blocks 26i may be engaged by screws or the like such as indicated at 26l in FIGURE 10. The extreme outer ends of the bar 26c mounting the blade 26 are each provided with short studs 26m pivotally engaging a turnbuckle element 26n comprising an oppositely threaded screw 26o and a second turnbuckle element 26p pivotally engaged by a stud 26q fixed in a rotating disc 26r. Thus the blade 26 is driven from both sides to give needed action for heavy work, while the turnbuckle arrangement permits vertical adjustment of the blade as required for heavier or lighter workpieces. The discs 26r are affixed to opposite ends of a shaft 26s arranged and driven as will later be described.

With reference now to FIGURES 1 and 3, the receiving conveyor 31 comprises a pair of side plates 59 and 60 held in spaced relation by a plurality of spacer rods or the like indicated at 61 and having journaled bearings mounting the rolls 62 and 63 between which a plurality of belts 64 are operatively arranged. The roll 62 mounts a spur gear 65 (FIG. 3) by which the conveyor belts are driven by reason of drive gear 66 mounted on the shaft 26s as will later be described. For convenience in raising or lowering the conveyor as required to receive lighter or heavier workpieces, its side plates 59 and 60 are respectively provided with flanges 59a and 60a (FIG. 1), having elongated holes or slots generally indicated at 68 which receive bolts generally indicated at 69, each of which extends downwardly through a pair of spacer blocks 69a and 69b as best shown in FIGURE 3. By removal of the spacer blocks or by use of additional blocks, the entire conveyor assembly 31 may be lowered or raised as desired, the slotted arrangement of the flanges permitting shifting of the assembly as required to retain driving relation of the gears 65 and 66.

The initial creasing rolls 27 and 28 comprise a somewhat conventional resilient mounting wherein the spindles of roll 28 are journaled in bearing elements such as the element 70 as shown in FIGURE 3, the element 70 being pivotally mounted as at 71 and being urged by a spring 72 to resiliently retain the roll 28 in coacting relation with the fixedly journaled roll 27. The roll 27 is arranged on a shaft 27a driven as will later be described and which mounts a spur gear 27b driving a similar gear 28b fixedly mounted with respect to roll 28. In like manner the roll 29 is arranged on a shaft 29a which also mounts spur gear 29b driving a similar gear 30b fixedly mounted with respect to the roll 30, the spindles of which are journaled in bearing elements such as the element 73 pivotally mounted as at 74 and urged by a spring 75 into coacting relation.

With reference now to FIGURES 1 and 2, the various shafts are driven by a motor 75 having a variable speed pulley 76 driving a belt 77 running over a larger pulley 78 fixed on a shaft 79 journaled between the side plates 11 and 12 and comprising also a roller 80 which drives the conveyor belts 20, 21 and 22 as previously described. The shaft 79 mounts a sprocket 81 having a chain 82 running over sprocket 83 to drive the shaft 27a comprising the creasing roll 27, the shaft 27a also mounting a sprocket 84 which drives chain 85 and sprocket 86 fixed on the shaft 29a which comprises the creasing roll 29. On its opposite end as best seen in FIGURE 6, the shaft 79 mounts a pinion gear 87 driving a larger gear 88 arranged on the shaft 45 which in addition to mounting the cam 44 as before described also mounts a disc 90 having perforations 90a and 90b which serve to selectively receive a crank pin 90c engaging the link 91 pivotally affixed as at 91a to a lever 92 having pivoted mounting on the shaft 17 and carrying a pawl 92a adapted for coaction with a ratchet 93 fixed on the shaft 17. As before described the shaft 17 mounts the feed wheels 18 and 19 and it will now be clear that the ratchet 93 provides the intermittent drive as described and that the amount of for-

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ward movement imparted to the feed wheels may be varied by means of the crank pin perforations 90a and 90b. The perforation 90a producing a longer stroke as needed for heavier work and the perforation 90b producing a shorter stroke as needed for lightweight or coated work. A small brake drum 94 fixed on the shaft 17 is lightly engaged by a friction element 95 to prevent over-travel of the feed wheels.

The shaft 26s previously described mounts a sprocket 96 (FIG. 9) by which the shaft is driven by a chain 97 which (FIG. 1) is driven by a sprocket 98 fixed on the shaft 45.

A principal advantage of my invention resides in the feeding arrangement comprising the interspaced initial feed rolls which withdraw the workpieces squarely from the pile and the like, spaced secondary feed rolls or drop rolls which function in timed relation to advance the workpieces squarely against a stop member. The arrangement described is especially advantageous where folding of heavier workpieces comprising may thicknesses of paper is required.

Modifications of my invention will occur to those skilled in the art, and it is to be understood that I am not limited to the precise arrangement of parts as shown and described but by the scope of the appended claims.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A tabloid folding machine comprising means for advancing singly from a stack of work pieces each composed of a plurality of sheets having a folded side edge with the other three edges of the sheets cut and lying one over the other, said means provided with feeding means compensating for the extra thickness of the folded edge and said means for advancing the work pieces arranged to advance the work pieces to a position underlying a reciprocating buckle folding knife, spaced feed belts underlying the position of the work pieces under said reciprocating knife, means for reciprocating said buckle folding knife, spaced drop rollers mounted on pivoted levers and provided with segmental gear drives timed with said means for reciprocating the buckle folding knife and

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adapted at a certain predetermined sequence of operation of said means for reciprocating the knife to lower the drop rollers to engage the upper surfaces of the work pieces and cause them to feed along on the feed belts, an adjustable stop against which the forward edge of the work piece abuts at the end of its positioning movement, and said means for reciprocating the knife actuatable when the work piece is positioned against the stop.

2. In a folding machine of the type having a reciprocating blade with coacting creasing rolls and conveying means for advancing workpieces, an initial feed wheel arranged to singly withdraw workpieces from a source of supply, means for intermittently actuating said feed wheel in timed relation with movements of said blade whereby the leading marginal portion of a workpiece is advanced from said source of supply, a conveyor comprising constantly moving belts passing idly beneath said advanced leading marginal portion of said workpiece, a secondary feed means comprising a roll normally held in spaced non-contacting relation above said workpiece, and means actuatable in timed relation with movements of said reciprocating blade to shift said secondary feed means to contacting engagement with said workpiece whereby said workpiece is frictionally engaged by said conveyor and thereupon advanced to optimum position beneath said folding blade.

3. A device as defined in claim 2 wherein said initial feed wheel comprises a pair of feed wheels arranged in axial spaced relation.

4. A device as defined in claim 3 wherein said secondary feed means comprises a pair of rolls arranged in axial spaced relation.

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