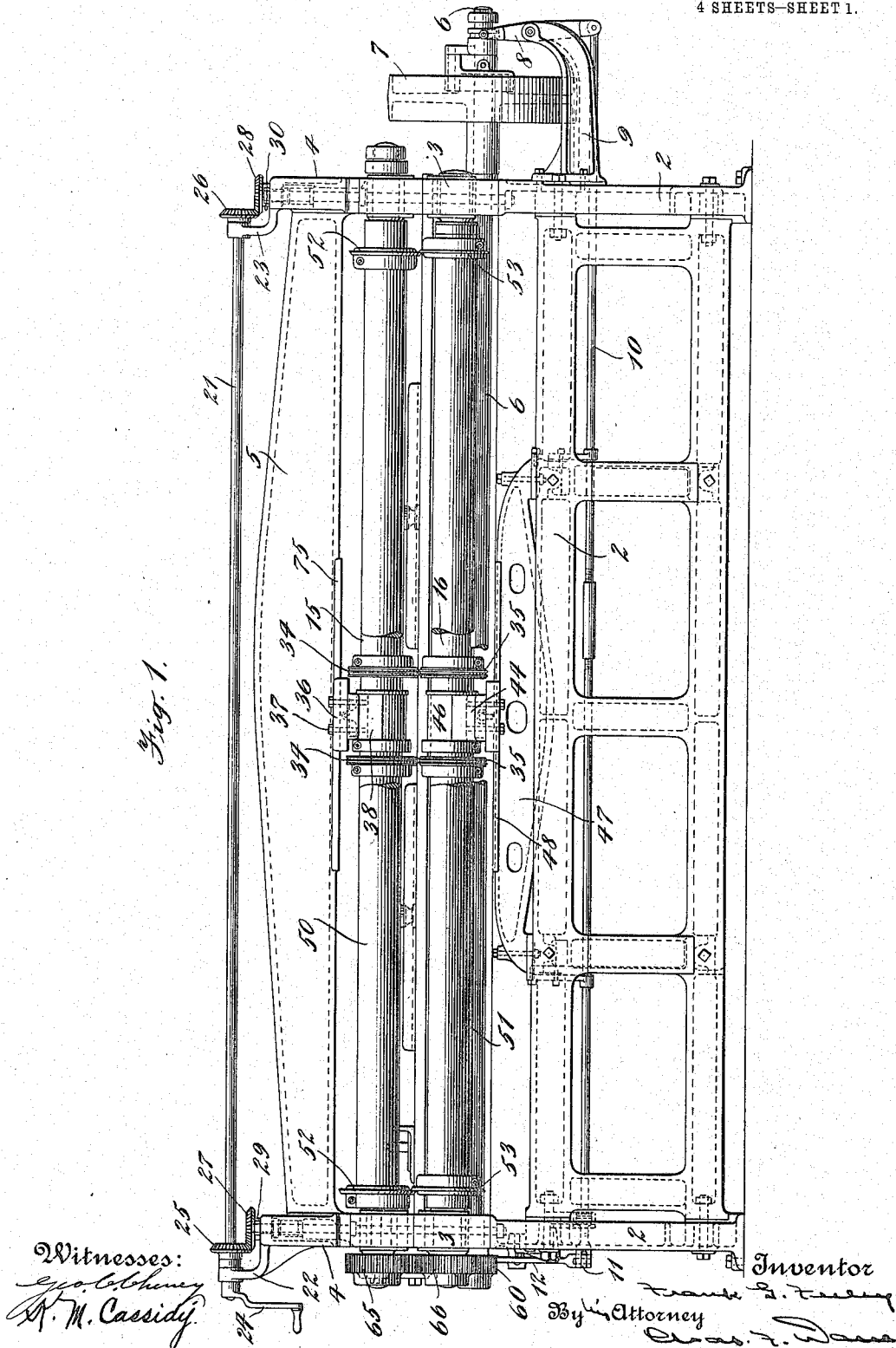


F. G. FEELEY.
MACHINE FOR OPERATING UPON PAPER BOARD.
APPLICATION FILED MAY 27, 1913.

1,122,268.

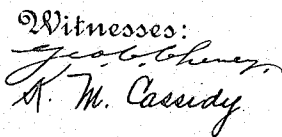
Patented Dec. 29, 1914.

4 SHEETS—SHEET 1.



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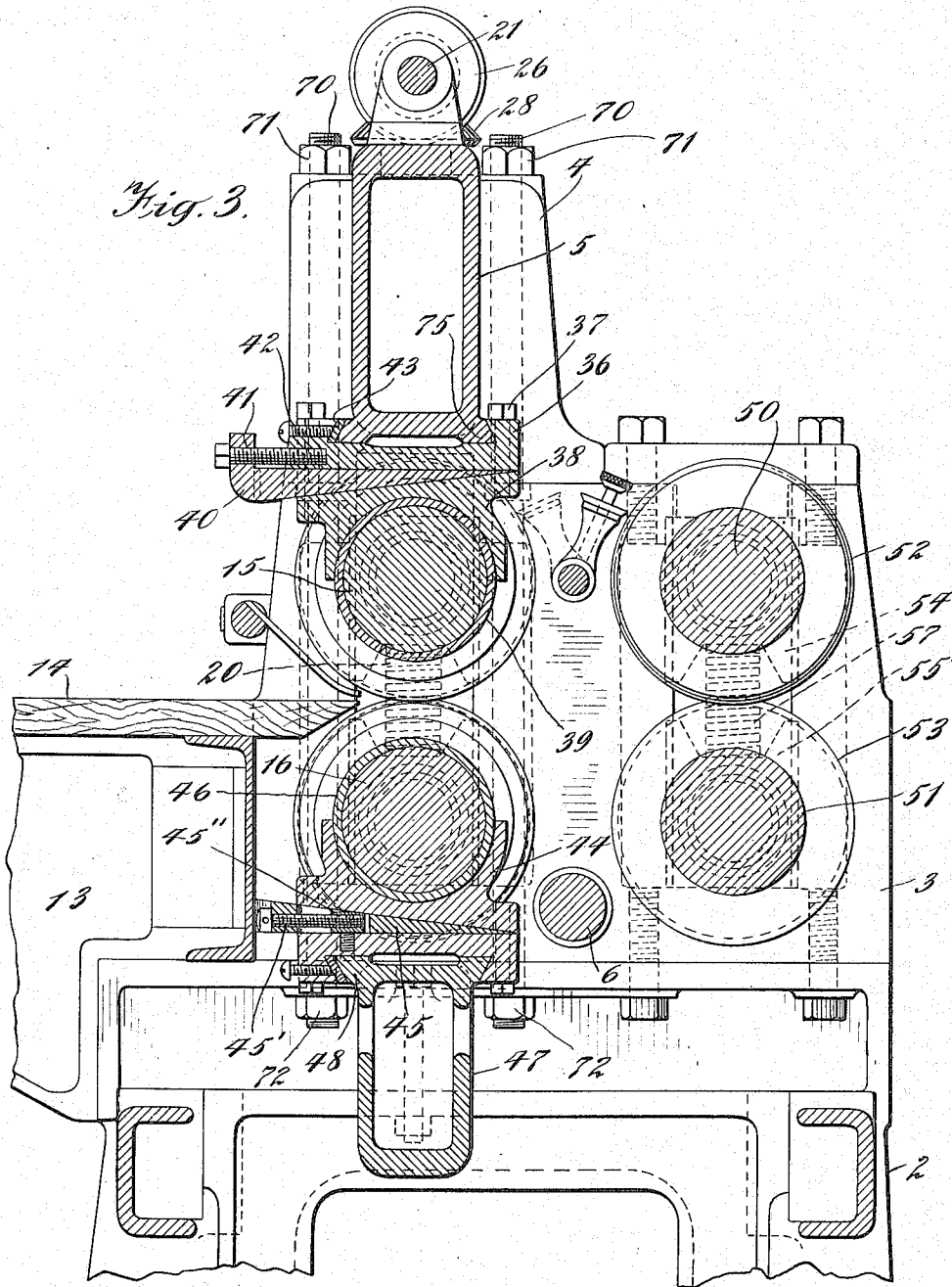
4 SHEETS—SHEET 2.



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4 SHEETS—SHEET 3.



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4 SHEETS—SHEET 4.

Fig. 6.

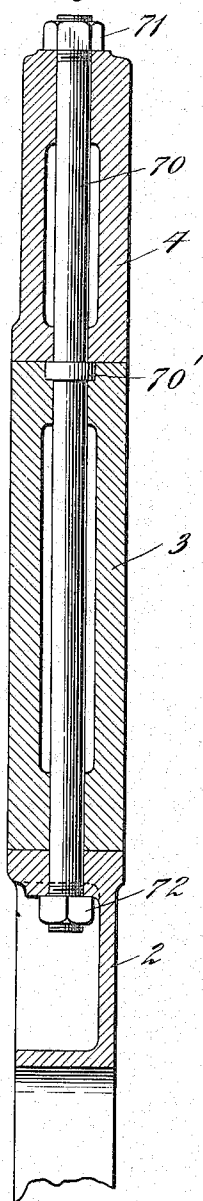


Fig. 5.

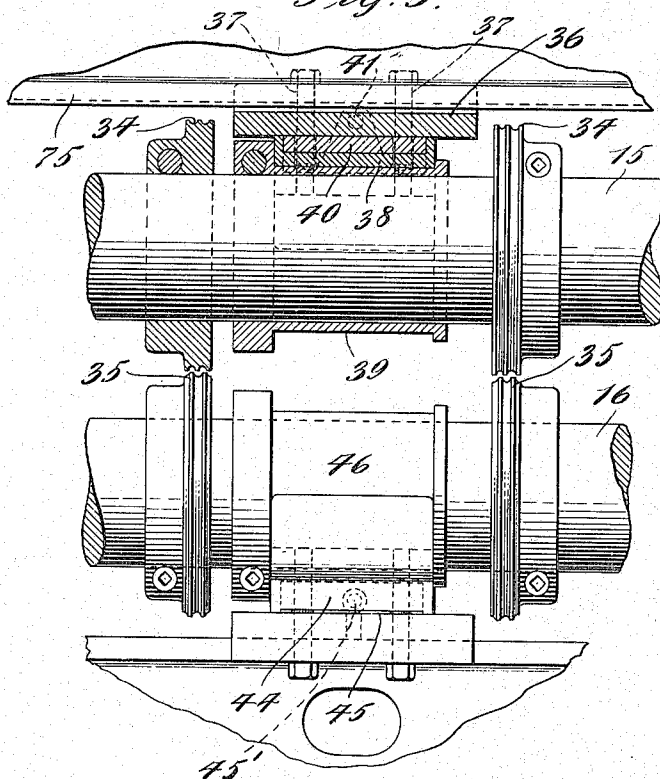
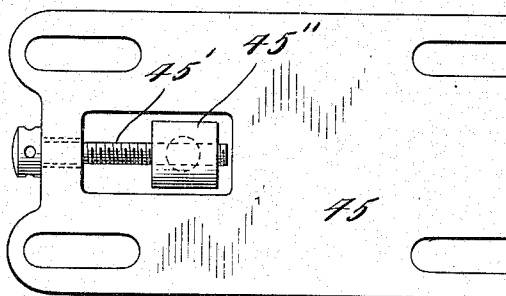


Fig. 7.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR OPERATING UPON PAPER-BOARD.

1,122,268.

Specification of Letters Patent.

Patented Dec. 29, 1914.

Application filed May 27, 1913. Serial No. 770,116.

To all whom it may concern:

Be it known that I, FRANK G. FEELEY, citizen of the United States, and resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Machines for Operating upon Paper-Board, of which the following is a specification.

This invention relates to a machine for operating upon paper board, and especially to a machine for creasing or slitting said board, and one of the main objects of the invention is to provide an improved machine of this class in which one or both of a pair of rolls or shafts carrying creasing or other blades may be more positively and rigidly supported, near the center or centers thereof, than in machines as heretofore constructed, in order that such shaft or shafts may better resist the pressure or thrust due to the action of such creasing or other blades upon a board passing between them.

Another object of the invention of equal importance is to provide means for quickly and positively adjusting or changing the width of the pass between cooperating creasing or other blades, in order that these blades and the parts carrying them may be readily set to permit the blades to crease or otherwise act upon stock of different thicknesses.

Other features of the invention not hereinbefore referred to will be hereinafter described and claimed, and are illustrated in the accompanying drawings, in which,

Figure 1 is a rear elevation of a combined creasing and slitting machine embodying the present invention; Fig. 2 is an enlarged, end elevation of the same, with parts broken away, looking from the left in Fig. 1; Fig. 3 is an enlarged, longitudinal, vertical section of a portion of said machine, showing the adjustments and the central supports hereinbefore mentioned; Fig. 4 is an enlarged detail of means for raising and lowering one end of the upper cross-bar of the machine, and also shows the manner in which the upper shaft moves with said cross-bar; Fig. 5 is a detail illustrating on an enlarged scale, and in vertical section and rear elevation, the central portion of the mechanism shown in Fig. 1; Fig. 6 is an enlarged, sectional detail through a portion of the frame-work of the machine, showing the manner in which the several superposed frame members are secured together, and Fig. 7 is an enlarged

detail illustrating in plan an adjusting wedge which will be hereinafter referred to.

Similar reference characters designate like parts in all the figures of the drawings.

My invention may be embodied in any suitable type of machine for operating upon paper-board—such as a creasing machine, a slitting machine, etc.—in which it is necessary or desirable to provide extra stiffness and support close to the points at which each sheet is operated upon in passing through such a machine. The machine illustrated as embodying the invention is, as before stated, shown as a combined creasing and slitting machine, most of the features of which are or may be those of well-known construction employed in similar machines in general use. The main frame and legs of the machine are designated generally by 2, and support at their ends suitable uprights, such as 3, (which, however, may be specifically different from corresponding portions of other machines) and above the frame members 3 are extensions, such as 4, in which is supported an upper cross-bar, 5, substantially of the usual construction. Other usual parts are a main driving shaft, 6, a band-wheel, 7, thereon, a clutch-operating or shifting lever, 8, pivoted in a bracket extension, 9, of the main frame or bed of the machine, a transverse connecting-rod, 10, for operating said shifting lever, and connections, such as the rod 11 and the controlling handle or lever 12, for operating the shifting lever 8 from a point convenient to the operator whereby to control the clutch and consequently the starting and stopping of the machine. In addition to these there is the usual forward bracket extension, 13, of the main frame, supporting in a well-known manner a feed-table, 14, on which successive sheets of cardboard are placed by the operator or operators and fed into the machine, suitable gages being also employed and shown in connection with said feed-board.

In connection with the devices before described and with various other usual parts of a machine of the class illustrated, which parts have not been referred to hereinbefore in detail, means are employed in which are embodied the principal features of the present invention, to wit, mechanism for varying the width of the pass between the creasing blades in accordance with the thickness of the stock, and means for prop-

erly supporting one or both of the rolls or shafts carrying such blades in all adjusted positions of the rolls and blades. The rolls or shafts just referred to for carrying the greasing blades are two of the principal elements of the machine illustrated. The upper roll or shaft is indicated herein at 15 and the lower at 16, and each is or may be of substantially the usual construction. They are shown as disposed horizontally and as parallel with each other, and they are mounted in suitable bearings in the ends of the main frame, that is, in the uprights 3 of the frame-work. The lower roll may be mounted in bearings in any suitable manner, but preferably in journal-boxes, such as 17, made in two parts, that is, divided along their horizontal centers, in order to provide abutting surfaces which may be properly dressed when it becomes necessary to take up wear. These boxes are also shown as formed with vertical ways at their sides for engaging parallel vertical guides formed by openings, 18, in the uprights 3 at opposite ends of the framework. The ends of the upper roll 15 may be journaled in bearings in a similar manner, and the upper roll should also be so mounted as to be capable of movement toward and from the lower roll or shaft 16, for the purpose of providing for the adjustment herebefore described for stock of different thicknesses. In the machine shown the shaft 15 is journaled at its opposite ends in boxes, 19, similar to those shown at 17, except that they face in the opposite direction. These boxes 19 are mounted to slide up and down on the guides formed by the openings 18 in the ends of the frame-work. The lower shaft 16 and its bearings, however, will usually be maintained in a stationary position with the boxes 17 in contact with the stop-walls at the bottoms of the openings 18. The boxes 19 are intended to move up and down on said vertical guides formed by the openings 18, the extent of movement being dependent upon the range of thicknesses of the boards to be put through the machine.

In the construction shown the boxes 17 and 19 at each end of the machine are maintained at a suitable distance apart by means of one or more strong coiled springs, such as 20, interposed between the upper side of the lower box and the lower side of the upper box, these portions of the two boxes being cut away and suitably shaped, as illustrated, to permit proper cooperation with such springs. The springs will always be under compression and the force exerted by them will be sufficient to maintain the sections or halves of each box in proper contact, and also sufficient to hold the lower box down at the extreme lower end of the opening 18 and to hold the upper box 19 always in the desired position or adjustment. Us-

ally the upper sides of the upper boxes 19 will abut directly against movable stop-faces, set to predetermined positions, controlling the location of such upper boxes and the shaft 15 with respect to the lower shaft and its boxes. These stop-faces are preferably embodied in the upper cross-bar 5, as will be clear by referring particularly to Fig. 4, from which it will be seen that said cross-bar has at 5'—and at each end of the bar—a horizontal stop-face resting directly on top of the upper half of the upper box 19. This upper cross-bar 5 is the usual heavy bar spanning the space between the end frames or uprights of the machine and constituting the principal means for tying these uprights together at their upper ends. The faces 5' of this cross-bar are intended to lie in a common horizontal plane, and the end portions, 5'', of said cross-bar are intended to be positively guided vertically on the upper portions of the guides formed by the openings 18 before described. The object of this construction is to permit said cross-bar to be moved up and down exactly vertically and to the same extent at both ends thereof, and to keep the gage stop-faces 5' thereof always in contact with the upper sides of the boxes 19, in order that, through the movements of this upper bar 5, up and down, exactly equal movements or adjustments of the upper shaft or roll 15 may be obtained at opposite ends of said shaft, and the creasing or other blades carried thereby maintained in proper relation to the cooperative blades of the lower roll 16 whatever may be the adjustment of the parts.

In order that the up and down adjustment of the cross-bar 5 and of the upper shaft 15 controlled by it and by the springs 20, before described, may be positively effected, and in order also that uniform up and down movements may be imparted to both ends of said cross-bar, suitable mechanism is preferably employed for moving said cross-bar up and down through equal distances at opposite ends thereof in a given time. Any suitable means may be employed for this purpose. That shown comprises an upper cross-shaft, 21, journaled in bearings in bracket extensions, 22 and 23, of the top members 4 of the end uprights, and this shaft has at the right-hand end of the machine a crank-handle, 24, for turning it. Said shaft also carries a pair of bevel-gears, 25 and 26, which mesh with corresponding bevel-gears, 27 and 28, secured to the upper ends of short shafts, 29 and 30, journaled in suitable bearings in the upper portions of the members 4 of the frame-work, these shafts being held against vertical movement between the cheeks of the hubs of the vertically disposed bevel-gears and of stop-collars, 31, thereon, but having

at their lower ends threaded portions 32, engaging corresponding threads of vertically disposed nuts, 33, formed in the upper sides of the end portions 5'' of the cross-bar 5. (See Fig. 4). The construction is such that when the crank-handle 24 is turned in one direction or the other the opposite ends of the cross-bar 5, will be raised or lowered exactly equal distances through the joint action of the bevel-gears and the screw threads 32 and 33, as will be obvious. When the crank is turned in a direction to cause the descent of said cross-bar the roll 15 and its creasing blades will of course be brought closer to the roll 16 and its blades to reduce the width of the pass for sheets of less thickness, and when said cross-bar descends in this manner it will not only carry down with it the upper roll or shaft 15 and its boxes 19, but will also put the springs 20 under further compression. When the crank-handle is turned in the opposite direction the cross-bar will of course be raised and the power of the expanding springs 20 will force the opposite ends of the upper shaft 15 (and also the boxes 19) upward equal distances maintaining them in constant engagement with the rising upper cross-bar. Thus under all conditions of operation the upper cross-bar and the upper shaft 15, with its boxes and creasing blades, will move vertically in unison with one another. The construction is also such that, when the handle is released after it has been turned to set the shaft 15 in the desired vertical relation to the shaft 16, all of the parts will be positively held or locked in the desired adjusted positions, this result being due to the manner in which the intermeshing teeth and threads are constructed and organized.

It is also important, as before stated, to provide in a machine of this class a strong support for one or both of the creasing rolls near the centers thereof, where the pressure in creasing sheets passing through the machine is most likely to bend such shaft or shafts away from the normal position. I therefore provide means for stiffening each shaft at or near its center, that is, adjacent to the creasing blades. In order to accomplish the desired result a central bearing is provided for the shaft 15—and preferably also for the lower shaft 16—and this central bearing, in a machine of the type just described, having the positive means for vertical adjustment previously referred to, is shown as carried by the upper cross-bar 5; and the shaft 15 is journaled in this central bearing carried by said upper cross-bar in such a manner that the stiff and heavy cross-bar 5 receives the thrust of the creasing rolls substantially at or near its center.

In Figs. 1 and 5 creasing blades, 34, of

well-known type are shown as clamped to the upper roll or shaft 15 and complementary creasing blades, 35, are shown as correspondingly secured to the lower roll or shaft 16. As is usual, these creasing blades are shiftable to various positions along their shafts in order that they may operate upon the stock to crease it on any lines desired. For this reason the central bearing just referred to is also preferably shiftable lengthwise of the cross-bar 5, said cross-bar having, in the construction shown, a guide, 75, on which the main element, 36, of the central bearing is mounted to slide back and forth from one end of the guide 75 to the other. (See Fig. 1.) When located in the desired position lengthwise of said guide 75 the central bearing 36 may be securely clamped in place and held there, as by means of clamp screws, such as 37. The central bearing 36 embodies in the construction illustrated (see particularly Figs. 3 and 5) two principal elements, one of which is the main part or saddle 36 of the bearing, while the other is a half-bearing, 38, which is secured to said saddle by the clamp screws 37. The shaft 15 is intended to cooperate with the bearing surface of this half-bearing 38 and to run in said half-bearing. The preferred construction is one in which a central sleeve, 39, is clamped to the shaft 15 at the proper point in the length thereof, which point will depend upon the position of the bearing as a whole lengthwise of the shaft 15, and it is the outer surface of this sleeve 39 that is in immediate contact with the bearing surface of the half-box 38. The object of this is to remove the wear at the central bearing from the shaft proper and have all the wear come upon the sleeve 39, which may be readily replaced when necessary. This sleeve is or may be clamped to the shaft in the same manner as the creasing blades 34. An important feature of the central bearing, which, it will be seen, moves up and down with the cross-bar 5 and is located vertically by the movements of said cross-bar, is the provision of means for compensating for and taking up wear of the bearing. In order to accomplish this result I have made provision for obtaining a relative adjustment vertically between the saddle 36 and the half-box 38, the means illustrated being a wedge 40, which is placed between these two parts, as shown in Fig. 3, and may be moved in or out between them to any desired position to determine the vertical relation between said parts 36 and 38. It will be noticed that the upper side of the half box 38 which cooperates with the lower side of the wedge 40, is tapered to the same angle as the lower side of the wedge itself, in order that it may cooperate properly with the wedge. An adjusting and clamp screw, 130

such as 41, is shown for the purpose of holding the wedge 40 in any position to which it may be shifted. The clamp-screws 37 serve to secure all the parts, 36, 38 and 40, firmly together when tightened. For the purpose of securely holding the central bearing in the desired position lengthwise of the shaft 15, another clamp screw is illustrated at 42 which engages a gib, 43, and when tightened clamps the gib between the slide and the guide in the well-known manner. The lower shaft 16 is also preferably supported and stiffened by a central bearing, such as 44, which is substantially identical in construction with the central bearing for the upper shaft 15 and is secured in place and adjusted by substantially identical means, except that the wedge for determining the vertical relation between the saddle portion and the half-box of the lower bearing is slightly different from the wedge 40 for the upper central bearing. The wedge for the lower central bearing is shown at 45, the difference between it and the upper wedge 40 being due merely to the fact that there is not room for a wedge of the type shown at 40 in the organization of the parts illustrated in connection with the lower central bearing. This wedge is shown in detail in Fig. 7 and its adjusting screw 45', passes into and works in a threaded lug projecting upward from the saddle portion of the lower central bearing 44, as illustrated at 45''. The lower shaft 16 is also preferably journaled in the half-box of the central bearing 44 in the same manner as the upper shaft 15, that is to say, a central sleeve, 46, is secured to the shaft 16 and this sleeve turns directly in the lower bearing. The lower central bearing 44 is also preferably supported in a manner similar to that previously described in connection with the upper central bearing 36, that is to say, said lower central bearing is carried by a lower cross-bar, 47, which, however, is rigidly secured to the main frame 2 of the machine, and this lower cross-bar has in turn a guide, 48, on which the saddle portion of the lower bearing 44 is adapted to slide, and to which it is adapted to be secured substantially in the manner before described in connection with the upper central bearing. Thus, both the upper and the lower central bearings illustrated are supported in such a manner, by substantially rigid upper and lower cross-bars, as to support and stiffen the shafts 15 and 16 carrying the creasing blades, at or near the centers of said shafts, and at the same time provision is made for all necessary regulation of the distance between said shafts 15 and 16 and the creasing blades, and also for vertical adjustments for taking up wear in the bearings themselves.

At the rear of the machine, and in line

respectively with the upper and lower shafts 15 and 16 carrying the creasing blades, are upper and lower shafts, 50 and 51, for carrying the usual slitting knives, 52 and 53, which knives or blades are also adjustable to any desired positions in the length of their respective shafts, and when adjusted may be securely clamped in such adjusted positions. These shafts are shown as journaled for rotation in boxes, 54 and 55, similar to those in which the shafts 15 and 16 are mounted, and in a substantially similar manner these boxes for the slitting shafts are mounted between the walls of guides formed by vertical openings, such as 56, similar to the openings 18. Springs, 57, similar to those at 20, are also shown for maintaining the boxes at the desired adjusted distance apart. In other words, the construction and organization of these parts is such that the shafts carrying the slitting knives may be supported and stiffened, if desired, in substantially the same manner as the shafts carrying the creasing blades, but as this is not ordinarily necessary, a cross-bar and adjusting means therefor similar to the cross-bar 5 and its adjusting mechanism are not illustrated herein.

Movement is imparted to the various shafts and creasing and slitting blades, just described, from the main driver, 6, by any suitable means, but preferably through intermeshing gears so constructed and organized that the teeth of the intermeshing gears will always intermesh to substantially their full depths in all vertical adjustments of the shafts they are intended to operate. The train of gearing employed for the purpose is illustrated at 60, 61, 62, 63, 64, 65 and 66, the gear-wheel 60 being the primary gear for driving the gears 61 and 63 of the upper and lower creasing shafts, and for also driving the gears 65 and 66 of the upper and lower slitting shafts, while the gears 62 and 64 are intermediates by means of which, in a manner which will be obvious by reference to Fig. 2, all of the gears on the ends of the creasing and slitting shafts are maintained in mesh to substantially their full depths with the gears 60, 62 and 64, no matter what may be the vertical position to which either the upper creasing shaft or the upper slitting shaft may be adjusted.

In Fig. 6 I have illustrated in detail the manner in which the three main sections of the frame-work at each end of the machine are secured together. From this view it will be seen that the lower or main section 2, the middle or housing section 3 in which the ends of the creasing and slitting shafts and their gears are mounted, and the upper section 4 supporting the upper cross-bar 5, are all securely tied together by vertical through-bolts, 70, threaded at their upper and lower ends to receive the usual nuts, 71

and 72, for holding all of the parts solidly together, so that the bolts will take the stresses due to the creasing action. Each of these through-bolts has near the center thereof a collar, 70', which is seated in a counter-bore at the top of the housing 3. When the nuts 72 are tightened the housings 3 are firmly secured in place, while the other parts can be assembled or moved as desired.

What I claim is:—

1. In a machine of the class described, the combination with a pair of uprights, of a cross-bar between said uprights, a pair of parallel shafts journaled in bearings in said uprights, a bearing carried by said cross-bar for coöperation with one of said shafts between the ends thereof, and means for effecting a simultaneous adjustment of the cross-bar and that shaft which coöperates with said bearing on the cross-bar in a direction toward and from the other shaft.

2. In a machine of the class described, the combination with a pair of uprights, of a cross-bar between said uprights, a pair of parallel shafts journaled below said cross-bar in bearings in said uprights and disposed one above the other, a central bearing carried by said cross-bar for coöperation with the upper one of said shafts near the center thereof, and means for effecting a simultaneous adjustment of the cross-bar and the upper shaft which coöperates with said central bearing on the cross-bar in a direction toward and from the other or lower shaft.

3. In a machine of the class described, the combination with a pair of uprights, of a pair of separated cross-bars disposed one above the other between said uprights and one being vertically adjustable relatively to the other, a pair of parallel shafts journaled in bearings in said uprights and disposed one above the other between said cross-bars, and a pair of bearings carried respectively by said cross-bars for coöperation with said shafts between the ends thereof.

4. In a machine of the class described, the combination with a pair of uprights, of a cross-bar between said uprights, a pair of parallel shafts journaled in bearings in said uprights, a central bearing mounted on and movable lengthwise of said cross-bar near the center of said bar for coöperation with one of said shafts near the center thereof, and means for securing said bearing to the cross-bar in any of its positions.

5. In a machine of the class described, the combination with a pair of uprights, of a cross-bar between said uprights and having a longitudinal guide near its center, of a pair of parallel shafts journaled in bearings in said uprights, a central bearing, a slide to which said central bearing is secured, said slide being mounted on and movable

along said guide, and means for securing said slide to said guide in any of its positions.

6. In a machine of the class described, the combination with a pair of uprights, of a cross-bar between said uprights, a pair of parallel shafts journaled in bearings in said uprights, a saddle secured to said cross-bar near the center of the latter, a central bearing associated with said saddle, and means for effecting a relative adjustment between said saddle and central bearing.

7. In a machine of the class described, the combination with a pair of uprights, of a cross-bar between said uprights, a pair of parallel shafts journaled in bearings in said uprights, a saddle secured to said cross-bar near the center of the latter, a central bearing associated with said saddle, a wedge between said saddle and bearing for effecting a relative adjustment between said parts, and means for securing said wedge in any desired adjusted position.

8. In a machine of the class described, the combination with a pair of uprights, of a cross-bar between said uprights, a pair of parallel shafts journaled in bearings in said uprights, a saddle secured to said cross-bar near the center of the latter, a central bearing associated with said saddle, a wedge between said saddle and bearing for effecting a relative adjustment between said parts, and means for shifting said wedge and for securing it in any desired adjusted position.

9. In a machine of the class described, the combination with a pair of uprights, of a cross-bar between said uprights and having a longitudinal guide near its center, a pair of parallel shafts journaled in bearings in said uprights, a saddle slidable on said guide, a central bearing associated with said saddle, and means for effecting a relative adjustment between said saddle and central bearing and for securing said parts in their adjusted positions.

10. In a machine of the class described, the combination with a pair of uprights, of a cross-bar between said uprights and having a longitudinal guide near its center, a pair of parallel shafts journaled in bearings in said uprights, a saddle slidable on said guide, a central bearing associated with said saddle, a wedge between said saddle and bearing for effecting a relative adjustment between said parts, and clamp-screws for holding said parts in their adjusted positions and securing them to said guide.

11. In a machine of the class described, the combination with a pair of uprights, of a pair of separated cross-bars disposed one above the other between said uprights, a pair of parallel shafts journaled in bearings in said uprights and disposed one above the other between said cross-bars, a pair of central bearings mounted on said respective

cross-bars near the centers thereof and movable lengthwise of said bars, and means for securing said bearings to said cross-bars in any of their positions.

5 12. In a machine of the class described, the combination with a pair of uprights, of a cross-bar between said uprights, a pair of parallel shafts journaled one above the other in bearings in said uprights, a central bearing
10 carried by said cross-bar for coöperation with one of said shafts near the center thereof, and means for effecting a vertical adjustment of said central bearing.

13. In a machine of the class described,
15 the combination with a pair of uprights, of a pair of separated cross-bars disposed one above the other between said uprights, a pair of parallel shafts journaled in bearings in said uprights and disposed one above
20 the other between said cross-bars, a pair of central bearings mounted on said respective cross-bars near the centers thereof for coöperation with said shafts near their centers, and means for effecting independent
25 vertical adjustments of each of said central bearings.

14. In a machine of the class described, the combination with a pair of uprights, of a cross-bar between said uprights, a pair of
30 parallel shafts journaled in bearings in said uprights and disposed one above the other below said cross-bar, a central bearing carried by said cross-bar for coöperation with said upper shaft, and means for simultane-
35 ously moving said cross-bar and the upper shaft toward or away from the lower shaft and for holding them in such positions.

15. In a machine of the class described, the combination with a pair of uprights, of
40 a cross-bar between said uprights, a pair of parallel shafts journaled in bearings in said uprights and disposed one above the other below said cross-bar, a central bearing carried by said cross-bar for coöperation
45 with said upper shaft, means connected with opposite ends of said cross-bar and the upper shaft for moving said ends equally toward or away from the lower shaft, and means for securing said cross-bar and the upper
50 shaft in said adjusted positions.

16. In a machine of the class described, the combination with a pair of uprights having vertical guides, of a cross-bar spanning the space between said uprights and
55 mounted to slide up and down on said guides, a pair of parallel shafts journaled one above the other below the cross-bar in bearings in said uprights, a central bearing carried by said cross-bar for coöperation
60 with said upper shaft, and means for positively moving said cross-bar and central bearing up and down between said uprights.

17. In a machine of the class described,

the combination with a pair of uprights 65 having vertical guides, of a cross-bar spanning the space between said uprights and mounted to slide up and down on said guides, a pair of parallel shafts journaled one above the other below the cross-bar in
70 bearings in said uprights, a central bearing carried by said cross-bar for coöperation with said upper shaft, and means connected with opposite ends of the cross-bar for positively moving said ends equally up or
75 down and with them said central bearing.

18. In a machine of the class described, the combination with a pair of uprights having vertical guides, of a cross-bar spanning the space between said uprights and
80 mounted to slide up and down on said guides, a pair of parallel shafts journaled one above the other below the cross-bar in bearings in said uprights, a central bearing carried by and movable lengthwise of said
85 cross-bar for coöperation with said upper shaft at any point near the center thereof, and means for positively moving said cross-bar and central bearing up and down between said uprights. 90

19. In a machine of the class described, the combination with a pair of uprights having vertical guides, of a cross-bar spanning the space between said uprights and
95 mounted to slide up and down on said guides, a pair of parallel shafts journaled one above the other below the cross-bar in bearings in said uprights, a central bearing carried by said cross-bar for coöperation with said upper shaft, means for positively
100 moving said cross-bar and central bearing up and down between said uprights, and means for effecting an independent vertical adjustment of said central bearing relative to said shaft. 105

20. In a machine of the class described, the combination with a pair of uprights having vertical guides, of a cross-bar spanning the space between said uprights and
110 mounted to slide up and down on said guides, a pair of bearings carried by and vertically movable on said uprights, a pair of parallel shafts disposed one above the other below the cross-bar, the upper shaft being journaled in said vertically movable
115 bearings and the lower shaft being also journaled in bearings in said uprights, a central bearing carried by said cross-bar for coöperation with said upper shaft, and means for positively moving said cross-bar
120 and upper shaft up and down between said uprights.

21. In a machine of the class described, the combination with a pair of uprights, of a cross-bar between said uprights, a pair
125 of parallel shafts journaled in bearings in said uprights, a central bearing carried by said cross-bar, and a journal sleeve sur-

rounding and secured to said shaft near the center thereof and coöperative with said bearing.

22. In a machine of the class described,
5 the combination with a pair of uprights, of a pair of separated cross-bars disposed one above the other between said uprights, a pair of parallel shafts journaled in bearings in said uprights and disposed one
10 above the other between said cross-bars, a pair of central bearings carried respectively by said cross-bars, and a pair of jour-

nal sleeves surrounding and secured respectively to said shafts near the centers thereof and coöperative with said respective 15 bearings.

Signed at Chicago, in the county of Cook, and State of Illinois, this 22 day of May A. D. 1913.

FRANK G. FEELEY.

Witnesses:

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N. F. MORRISSEY.