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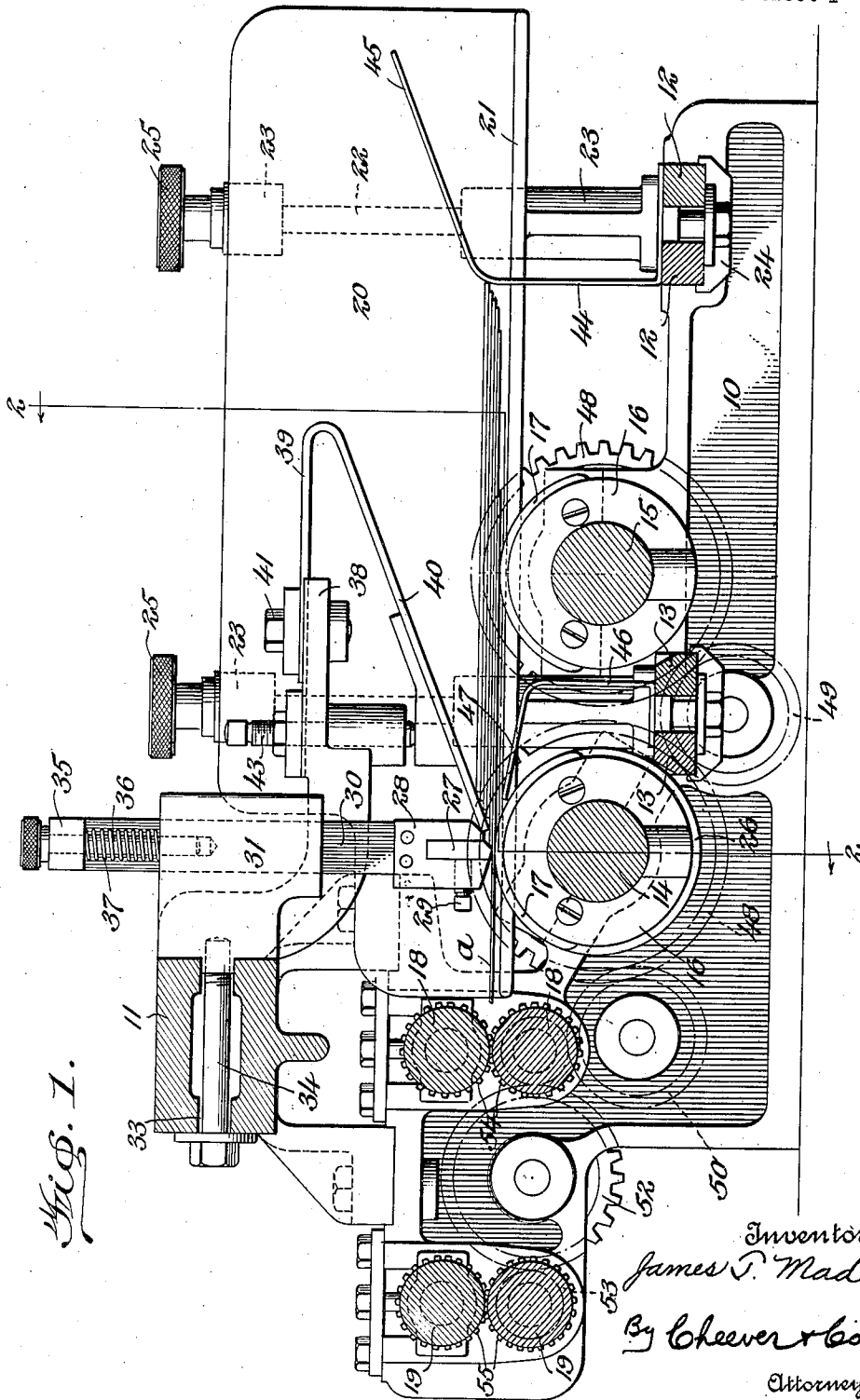
J. T. MADER

1,596,056

AUTOMATIC FEEDER FOR PROCESS MACHINES

Filed April 6, 1925

4 Sheets-Sheet 1



Inventor
James T. Mader,
By Cheever & Cox
Attorney

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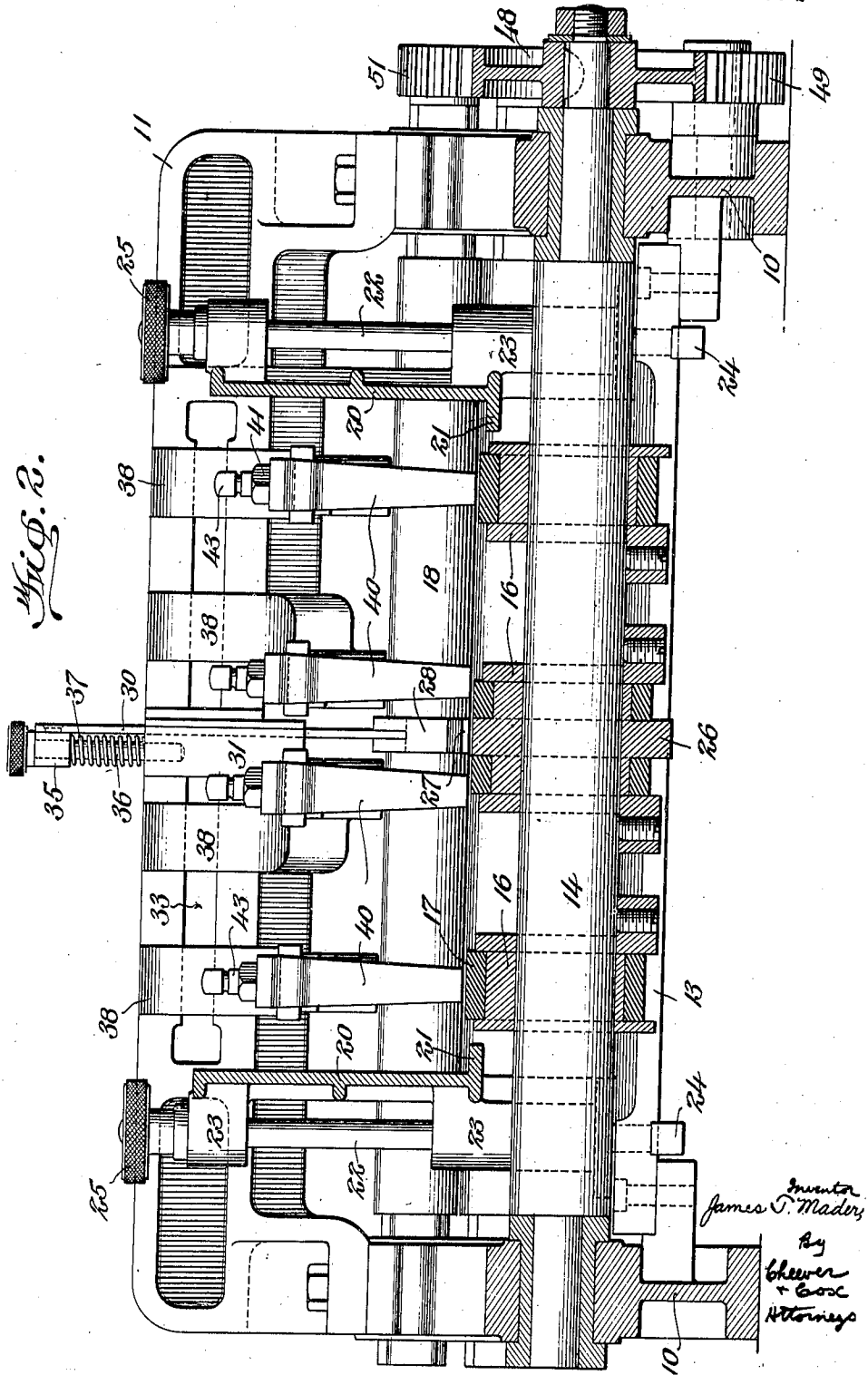
J. T. MADER

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AUTOMATIC FEEDER FOR PROCESS MACHINES

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4 Sheets-Sheet 2



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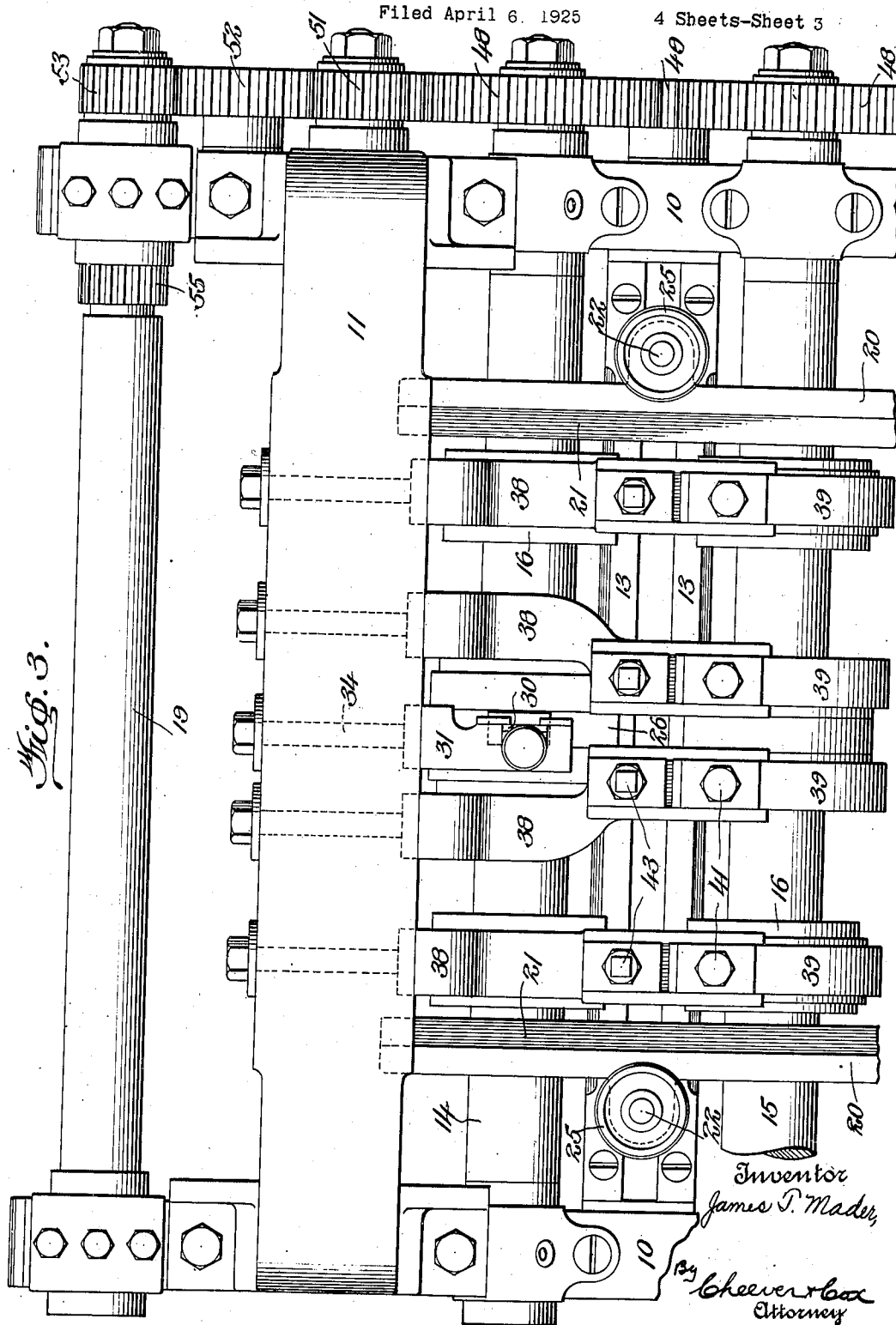
J. T. MADER

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AUTOMATIC FEEDER FOR PROCESS MACHINES

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4 Sheets-Sheet 3



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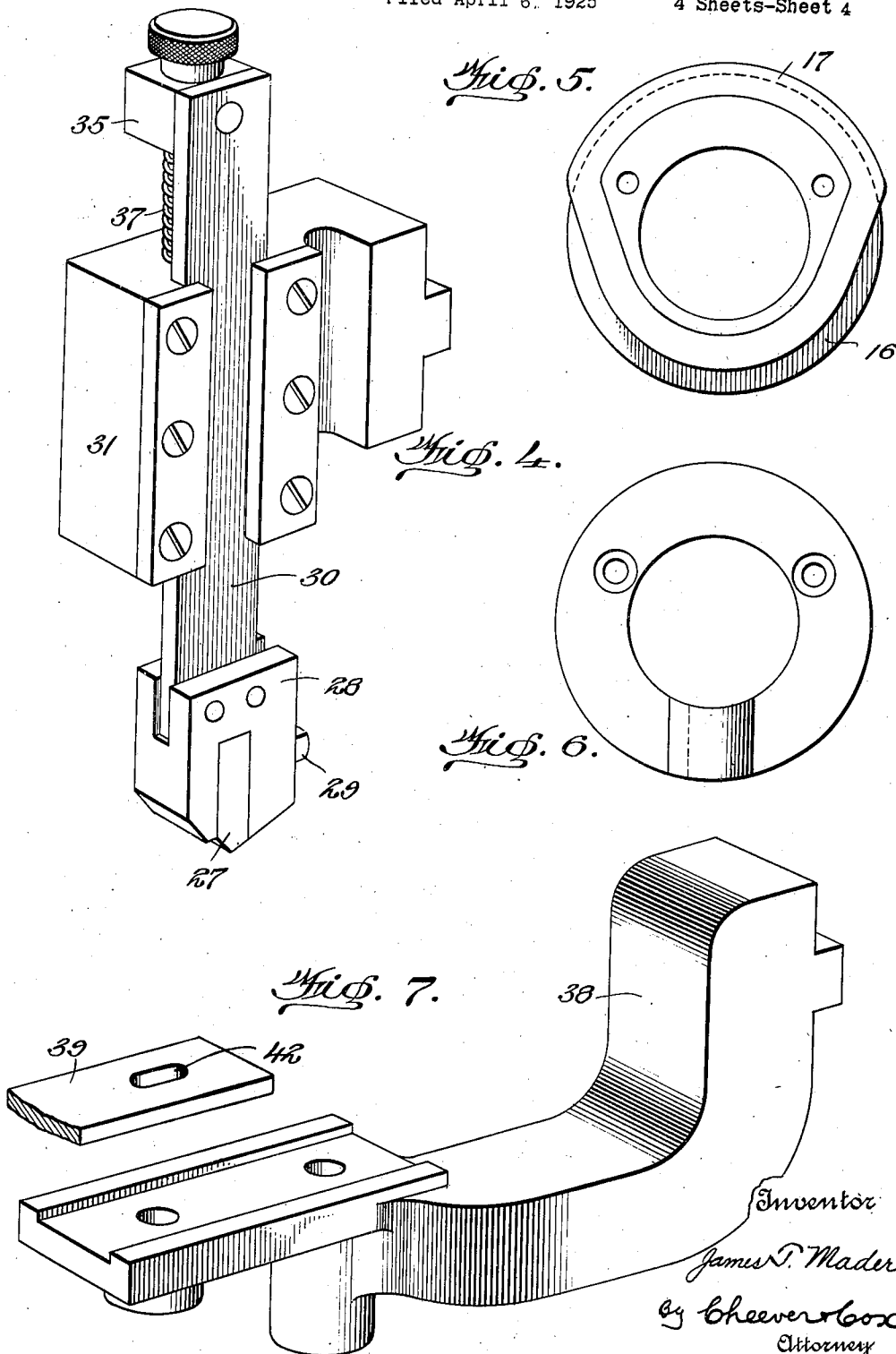
J. T. MADER

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AUTOMATIC FEEDER FOR PROCESS MACHINES

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4 Sheets-Sheet 4



Inventor
James T. Mader,
by Cheever Cox
Attorney

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UNITED STATES PATENT OFFICE.

JAMES T. MADER, OF DUNDALK, MARYLAND, ASSIGNOR TO MENASHA PRINTING AND
CARTON COMPANY, OF MENASHA, WISCONSIN, A CORPORATION OF WISCONSIN.

AUTOMATIC FEEDER FOR PROCESS MACHINES.

Application filed April 6, 1925. Serial No. 21,097.

My invention relates to sheet feeding apparatus, and has for its object to provide improved means for feeding sheets, carton blanks for example, successively from a stack, at regularly spaced and timed intervals, and in identical positions, to any continuously operating process machine, so that any process, such as printing, cutting, folding, dewaxing or the like, may be performed on each and every carton in identical manner and in regular sequence.

The sheets first are fanned, that is, a stack of sheets is bent and the sheets allowed to slide on each other, so that their edges present the appearance of a flight of steps. They then are deposited in a portion of the apparatus designed to receive and support them in operative relation to the feeding mechanism, which latter consists essentially of cam rollers operating to extract the sheets successively and at regularly spaced and timed intervals from the bottom of the stack and to deliver them between feed rolls, which rolls in turn deliver them in like manner and in identical positions to the process machine.

It has been found that the lowermost sheets of a fanned stack will slide more freely from beneath the stack than if the stack was composed of sheets arranged in alined superimposed relation, and therefore it is my more specific purpose to provide means to maintain a fanned relation of the sheets of a stack that has been deposited in the machine, and which will operate to impart a fanned relation to the sheets of a stack that has not properly been fanned prior to being deposited in the apparatus.

Also it is my purpose to provide an improved means of preventing more than a single sheet being fed at a single operation, and to provide various adjustments whereby sheets of different sizes and thicknesses may be accommodated, all in an apparatus of simple construction, that is relatively cheap and easy to produce and thoroughly reliable and efficient in operation.

With the foregoing and other purposes in view, my invention consists in the novel features of construction, combination and arrangement of parts, as will be hereinafter more fully described, illustrated in the accompanying drawings and defined in the appended claims.

In the drawings, wherein like characters of reference denote corresponding parts in the different views

Figure 1 is a longitudinal section through a feeding apparatus embodying the novel and essential features of my invention;

Fig. 2, a transverse section on the line 2-2 of Fig. 1;

Fig. 3, a top plan of the major portion of the apparatus;

Fig. 4, a perspective of the adjustable sheet stop device;

Fig. 5, an end view of one of the feed cams, the retaining plate for the pliable cam element being removed;

Fig. 6, an elevation of the cam element retaining plate mentioned in the description of the preceding figure; and

Fig. 7, a perspective of one of the friction finger supporting members.

My improved apparatus includes essentially a pair of spaced side frames 10, 10 rigidly connected together near their forward ends by an arched tie bar 11, and near their rear ends and intermediately by spaced pairs of tie rods 12, 12 and 13, 13 respectively.

A pair of spaced transverse rotatable shafts 14 and 15 are journaled at their ends in suitable bearings on the side frames 10, 10, and carried by each of said shafts is a plurality of rollers 16 each having a cam segment 17 preferably of yieldable material for engaging and successively feeding single sheets from a stack during their rotation, as will hereinafter appear.

The shafts 14 and 15 are located intermediate of the ends of the side frames 10, 10 and one of them, 14, preferably is located forwardly of the tie rods 13, 13, while the other, 15, preferably is located to the rear of said tie rods. In addition said shafts are disposed in the same horizontal plane and somewhat below two spaced pairs of upper and lower transverse feed rolls 18, 18 and 19, 19, so that a sheet *a* resting on and being fed forwardly by the cam segments 17 will be directed between said feed rolls.

Supported upon the tie rods 12, 12 and 13, 13 is a pair of transversely spaced plates 20, 20 each having an inwardly directed flange 21 disposed at such elevation above the shafts 14 and 15 as normally to support a stack of sheets to be fed with the lower-

most sheet disposed in the path of movement of the cam segments 17, so that said cam segments will operate when rotated to frictionally engage the underface of the lowermost sheet and feed it to the rollers 18, 18 and 19, 19.

The plates 20, 20 serve to prevent the sheets of a stack deposited between them and resting on the flanges 21 from moving transversely with respect to one another, and in order that they may be adjusted towards and away from each other to accommodate sheets of different widths, releasable clamp screw devices are provided for securing them to the tie rods 12 and 13, said devices consisting of screw members 22 passing between the tie rods and through bosses 23 cast with the plates 20, 20, and having heads 24 straddling the tie rods, and further having thumb screws 25 threaded thereon whereby the plates may be drawn into clamping relation to said tie rods in any adjusted position of said plates along said tie rods.

A roller 26 is mounted on shaft 14 and said roller is of such diameter that its peripheral surface is flush with the cam surfaces 17 on said shaft, and disposed directly over this roller is a stop device in the form of an abutment member 27, spaced from the periphery of said roller a distance substantially equal to the thickness of a sheet to be fed, so that more than a single sheet is prevented from being fed between said roller and said abutment member simultaneously.

Abutment member 27 is detachably secured within a slot in a block 28 by a set screw 29, and said block is carried at the lower end of a rod or bar 30 vertically slidable in a guideway suitably provided in a casting 31, which latter is mounted on the tie bar 11 in any suitable manner, so as to be adjustable therealong in harmony with adjustments of the roller 26 and cam rollers 16 along shafts 14 and 15 to accommodate sheets of different widths and shapes. The present manner of adjustably mounting casting 31 on tie bar 11 consists in slotting said tie bar as indicated at 33 and passing through said slot a bolt 34 and threading said bolt into said casting so that the latter may be clamped tightly against the tie bar in any adjusted position along the same.

At the upper end of rod or bar 30 is a lug 35, and passing loosely through this lug and threaded into the casting 31 is a bolt 36 having a coil spring 37 surrounding the same between said casting and said lug. The coil spring maintains the rod or plate 30 and consequently the stop member 27 at its uppermost limit of movement as determined by engagement of lug 35 with the head of said bolt, and by turning the latter the abutment member may be moved to-

wards or away from the roller 26 to vary the width of the space between the stop member and said roller to accommodate sheets of different thickness.

Also mounted on slotted tie bar 11 for adjustment therealong in the same manner as casting 31, is a plurality of bracket arms 38 each supporting an inherently resilient finger member 39 including an inclined portion 40 extending downwardly and forwardly towards shaft 14 and terminating in slight spaced relation, respectively, to the cam rollers 16 carried by said shaft and to stop member 31. Clamping bolts 41 extending through slots 42 in the respective finger members and threaded into the respective brackets serve to secure said finger members to said brackets so that the former may be adjusted longitudinally towards and away from the stop member 27, while set screws 43 threaded in the respective brackets and engaging the inclined portions of the fingers serve as a means of adjusting the free end portions of the latter towards and away from the cam rollers 16.

Mounted on the tie rods 12, 12 at the rear of the apparatus is one or more fingers or plates 44 having inclined portions 45 which cooperate with the inclined portions 40 of fingers 39 to maintain a fanned relation of a stack of sheets disposed between the plates 20, 20, and to impart a fanned relation to a stack of sheets not properly fanned prior to being deposited in the apparatus, the stack, as is understood, being placed on the inclined portions of the fingers or plates 44 and allowed to slide down said inclined portions until their forward ends abut the inclined portions of fingers 39, whereby a fanned or stepped relation is imparted to the sheets and maintained as is manifest.

Mounted on the tie rods 13, 13, between the shafts 14 and 15, is one or more fingers 46 having a portion 47 inclined upwardly and forwardly towards the cam rollers on shaft 14-so as to direct the forward ends of sheets moved from beneath the stack by the cam rollers on shaft 15 between the stop member 27 and the aforesaid cam rollers on shaft 14.

Adjacent ends of the shafts 14 and 15 are equipped with duplicate gears 48, 48, between which is an idler gear 49 whereby said shafts are caused to rotate in the same direction and at the same speed, while meshing with gear 48 of shaft 14 is another idler gear 50 also meshing with a gear 51 on the lowermost feed roll 18, said gear 51 in turn meshing with an idler gear 52 which meshes with a gear 53 on the lower feed roll 19. In addition the feed rolls of the respective pairs are geared together as at 54, 55, respectively, so as to turn in opposite directions to feed sheets between them, and preferably the relative size of

the aforementioned gears 50, 51 and 52 is such that the feed rolls rotate considerably faster than the shafts 14, 15 so as to draw a sheet through between stop 27 and the forward cam 17 at a much faster rate of speed than cam 17 would do alone, which is advantageous for the reason that it speeds up production and results in one sheet being delivered from the apparatus before the succeeding sheet is delivered between said feed rolls, so that any tendency at clogging of the feeding mechanism is eliminated and a definite space is left between sheets, which is necessary in process operations.

Rotation is imparted to the shafts 14 and 15 and to the feed rolls in any preferred manner, and with a stack of fanned sheets resting on the flanges 21 and held against lateral movement by the plates 20, 20 the operation of successively feeding the sheets is apparent: As the cams 17 of shaft 15 contact with the lowermost sheet it is moved forwardly onto the cams 17 of shaft 14 and its movement is continued by said last mentioned cams towards the feed rolls 18, 18, from which it is delivered to feed rolls 19, 19 and subsequently ejected from the apparatus to any process machine with which the latter is associated. As the cams 17 contact with the lowermost sheet of the stack the stack is lifted slightly against the inherent resilient action of fingers 39, which results in sufficient friction between the cams and the lowermost sheet to cause the latter to be moved from beneath the stack as aforementioned, succeeding sheets being fed from the stack in exactly the same manner. Due to the cooperation of stop member 27 with roller 26 not more than a single sheet may be fed simultaneously since said stop member constitutes an abutment against which the forward end of the sheet next above the lowermost sheet contacts to hold said sheet and those above it against being moved forwardly.

I claim:

1. In sheet feeding apparatus, a pair of rollers for feeding single sheets successively from the bottom of a stack, one of said rollers being located beyond one side of the

stack and the other being located beneath the stack and adapted to feed the sheets to the first mentioned roller, and a finger between said rollers operable to direct the sheets onto the roller beyond the side of the stack, said finger being inclined upwardly towards said last mentioned roller.

2. In sheet feeding apparatus, a roller for feeding single sheets successively from the bottom of a fanned stack disposed above the same, yieldable fingers above said roller for exerting a slight downward pressure upon the stack of sheets to force the successive lowermost sheets into frictional engagement with said roller, said fingers being inclined whereby they also function to maintain a fanned relation of the sheets of the stack, and means whereby said fingers may be adjusted along said roller and towards and away from the same to accommodate sheets of different widths and lengths.

3. In sheet feeding apparatus, a roller for feeding single sheets successively from the bottom of a stack, a support above said roller, a yieldable finger mounted upon said support adapted to exert a slight downward pressure upon the stack to force the successive lowermost sheets into frictional engagement with said roller, and a member threaded in said support and engaging said finger for adjusting the latter up and down with respect to said roller.

4. In sheet feeding apparatus, a pair of spaced side frames, tie bars arranged in spaced pairs rigidly connecting said side frames, a pair of side plates having inturned flanges for supporting a stack of sheets, means for delivering the sheets successively from said stack, bosses on said side plates resting upon said tie bars, and bolts passing through said bosses and between said tie bars having heads engaging the under faces of said tie bars whereby said plates may be adjusted transversely of the apparatus and secured in different adjusted positions.

In witness whereof, I have hereunto subscribed my name.

J. T. MADER.