June 23, 1942. W. E. SCHNEIDER ET AL 2,287,140

SHEET FEEDING APPARATUS

Filed March 26, 1941 4 Sheets-Sheet 1

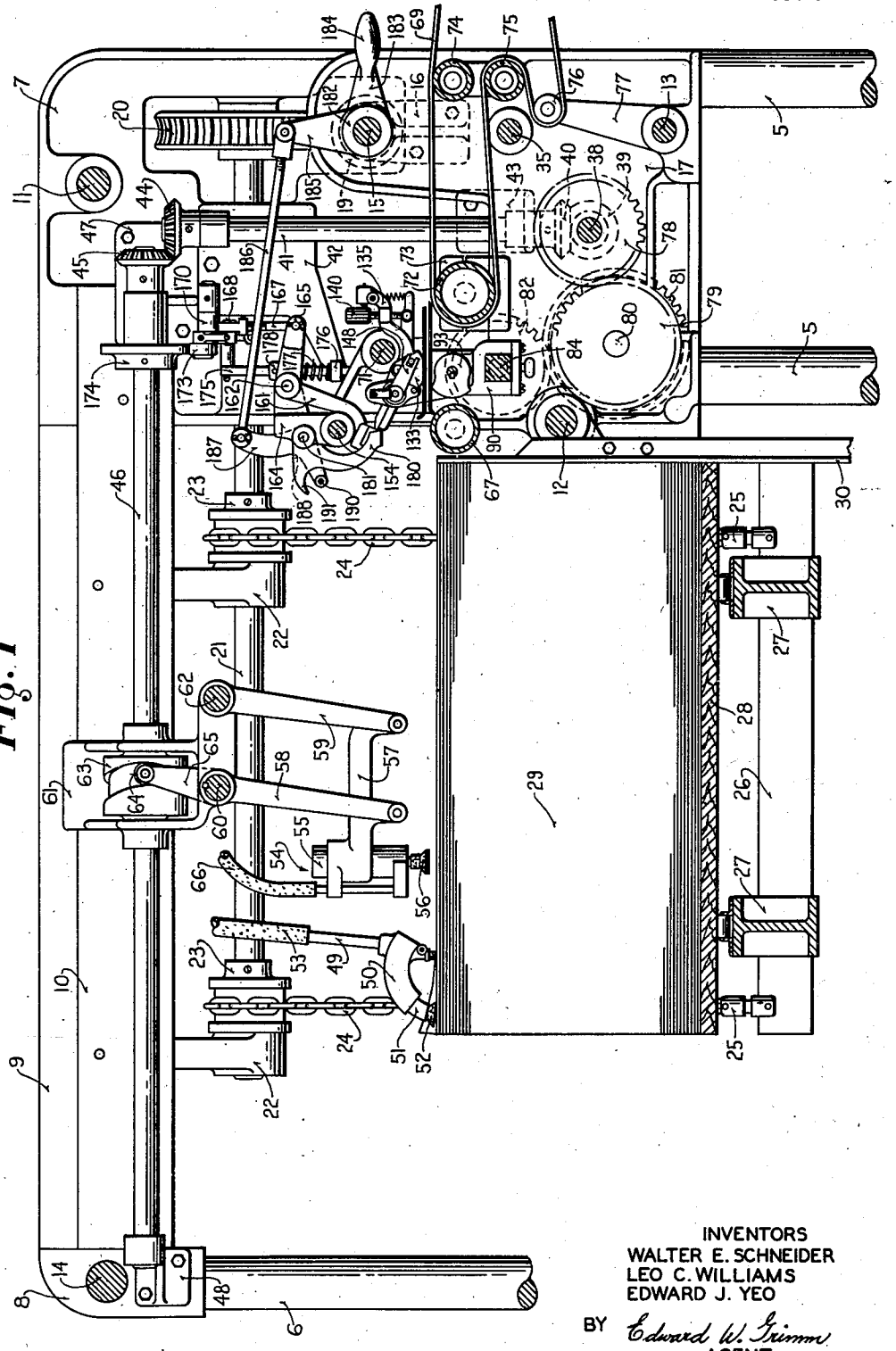


Fig. 1

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SHEET FEEDING APPARATUS

Filed March 26, 1941 4 Sheets-Sheet 2

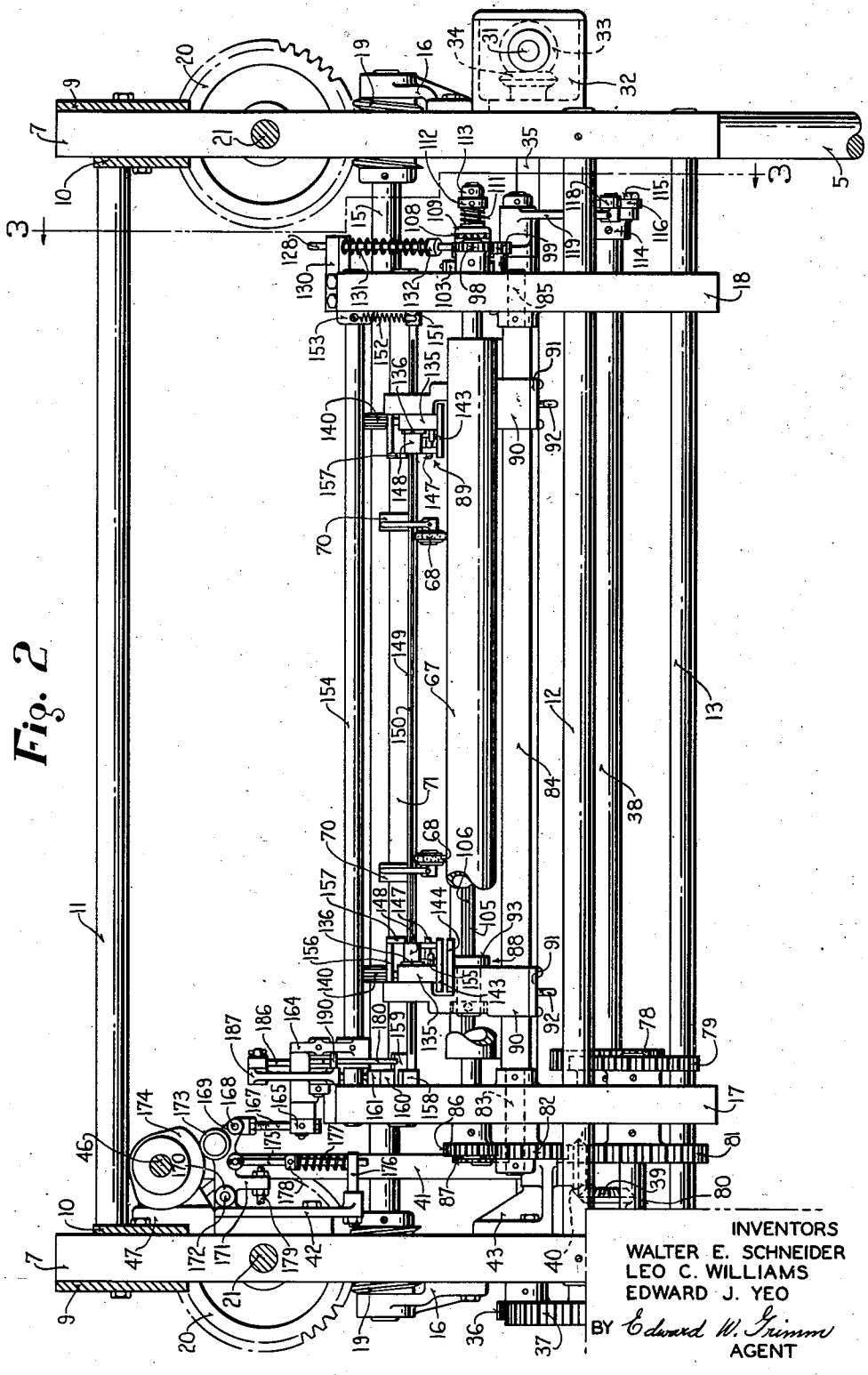


Fig. 2

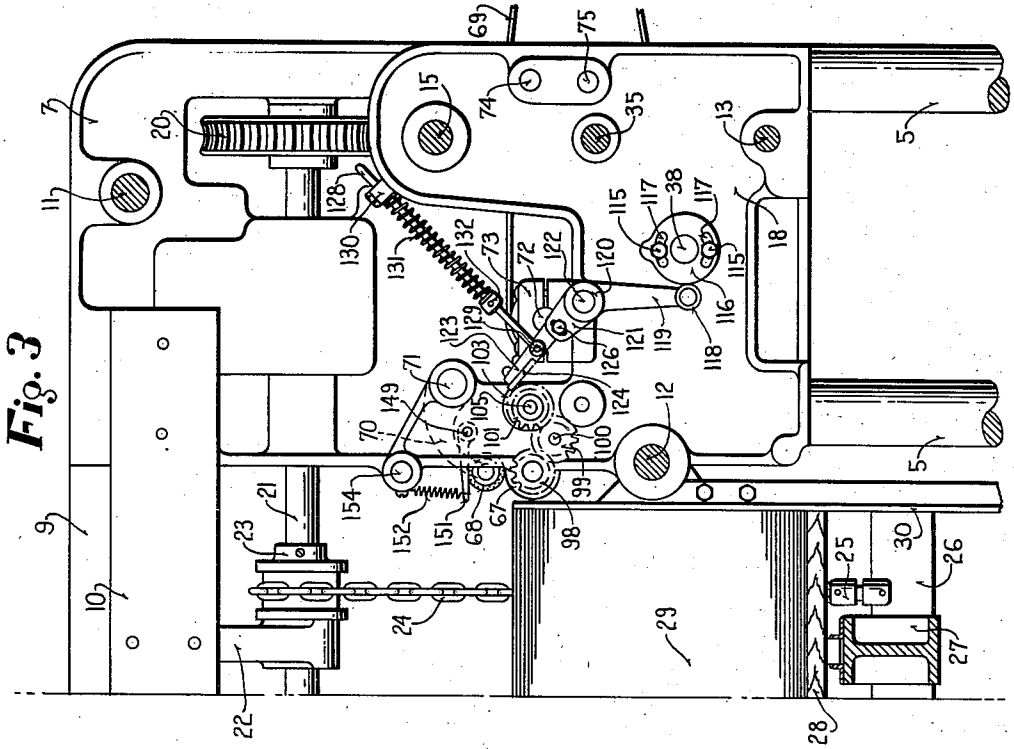
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SHEET FEEDING APPARATUS

Filed March 26, 1941 4 Sheets-Sheet 3

Fig. 3



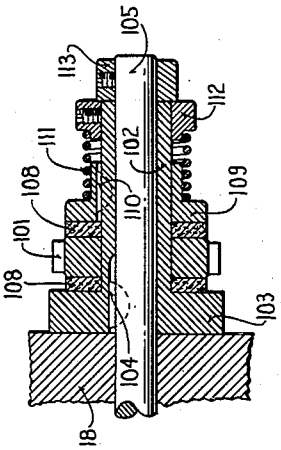


Fig. 8

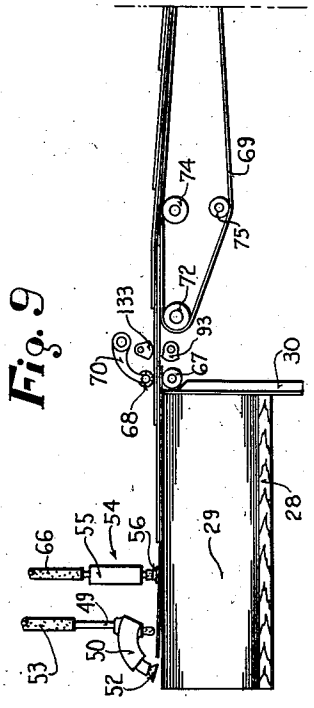


Fig. 9

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SHEET FEEDING APPARATUS

Filed March 26, 1941 4 Sheets-Sheet 4

Fig. 4

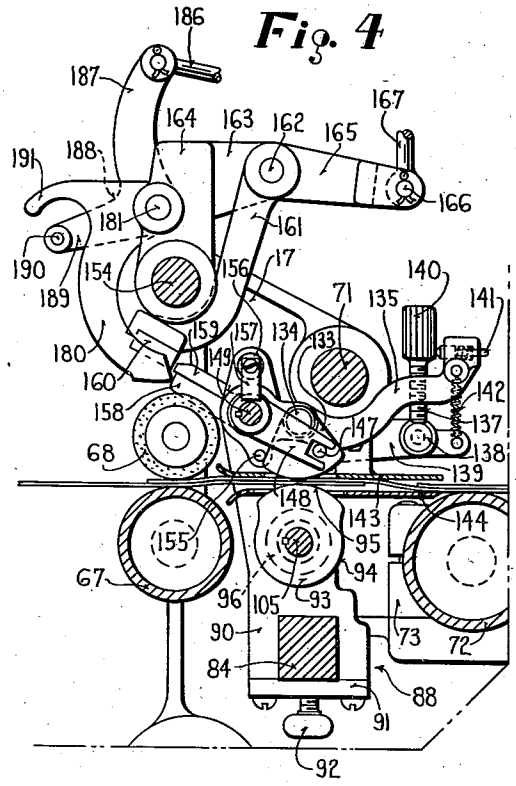


Fig. 5

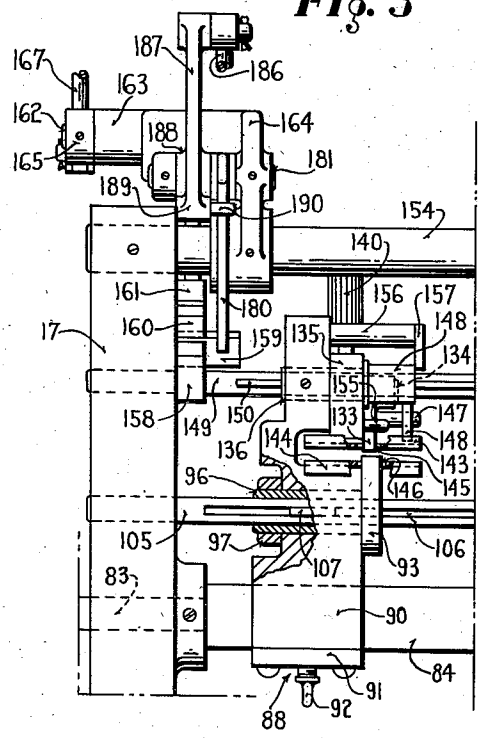


Fig. 6

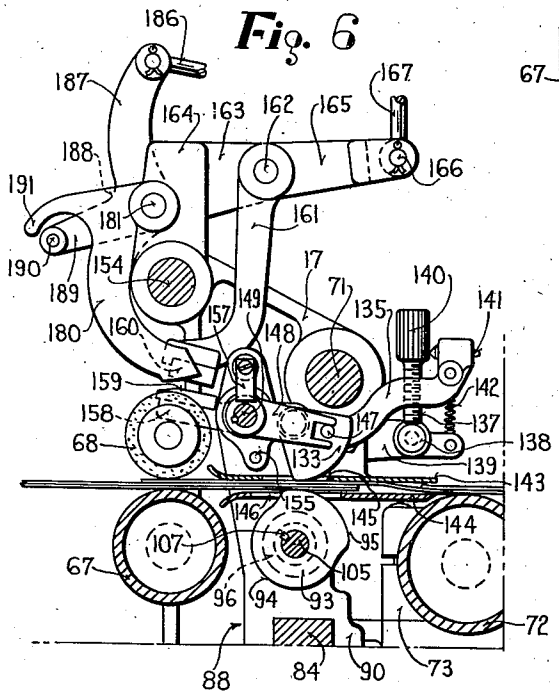
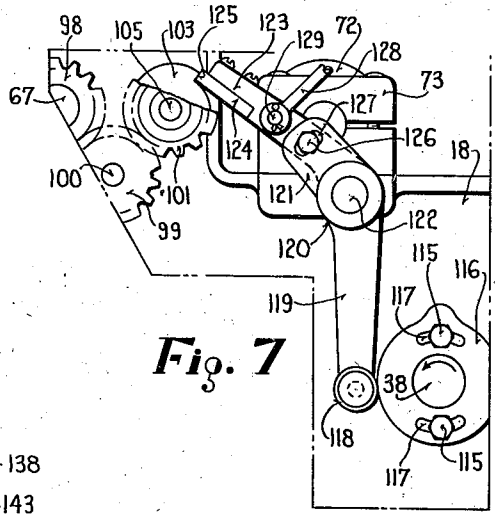


Fig. 7



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UNITED STATES PATENT OFFICE

2,287,140

SHEET FEEDING APPARATUS

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Application March 26, 1941, Serial No. 385,242

20 Claims. (Cl. 271—56)

This invention relates to sheet feeders and more particularly to sheet calipering or excess sheet detecting mechanisms thereof employed to prevent a sheet feeder from feeding more than one sheet at a time to a printing press or sheet fed machine.

The present invention while capable of use in sheet by sheet feeders is particularly adapted for embodiment in stream feeders wherein the sheets are advanced in lapped relation from a pile or supply to a printing press or other instrumentality with which the feeder is associated.

One object of the present invention is to provide an improved sheet calipering mechanism for stream feeders which will measure stream thickness as distinguished from sheet thickness, and which will operate with absolute certainty on all sheets in spite of the fact that the overlap of the sheets varies as sheets of different sizes are handled in the feeder.

Another object of the present invention is to provide an improved sheet calipering mechanism for stream feeders and which is constructed, arranged and operated in a manner such that the calipering operation is effective at a predetermined time with relation to each sheet added to the stream whereby said operation will be performed on a predetermined number of sheets in the stream including the sheet added thereto.

Another object of the present invention is to provide an improved sheet calipering mechanism for sheet feeders which, when actuated due to feeding of an excess sheet or sheets, is held in actuated position by novel means for this purpose to prevent resetting thereof until sheet feeder control means associated with and controlled by said mechanism is rendered effective to stop the feeder.

Another object of the present invention is to provide an improved sheet calipering mechanism for sheet feeders and wherein the calipering operation is accomplished by a rotary member which is normally disposed out of calipering position, and so operated and controlled that it makes one revolution only during each cycle of operation of the feeder and substantially at the same surface speed as that of the sheets to be calipered.

These and other objects of the present invention will appear as the following description thereof proceeds and in order to more clearly understand said invention reference may be had to the accompanying drawings which illustrate one embodiment of said invention.

In said drawings:

Fig. 1 is a fragmentary vertical longitudinal sectional view of a stream feeder embodying sheet calipering mechanism constructed and arranged in accordance with the present invention;

Fig. 2 is a fragmentary rear elevation, partly in section, of the feeder and sheet calipering mechanism shown in Fig. 1;

Fig. 3 is a fragmentary vertical longitudinal sectional view on the line 3—3 of Fig. 2;

Fig. 4 is an enlarged fragmentary side elevation, partly in section, of the sheet calipering mechanism and feeder control means, showing the parts in their normal positions when no excess sheet or sheets are fed;

Fig. 5 is an enlarged fragmentary rear elevation, partly in section, of the sheet calipering mechanism and feeder control means shown in Fig. 4;

Fig. 6 is a view similar to Fig. 4 but showing the parts of the sheet calipering mechanism and the feeder control means in their positions when an excess sheet or sheets are fed;

Fig. 7 is an enlarged side elevation of driving and control means for the sheet calipering mechanism shown in Figs. 4, 5 and 6;

Fig. 8 is an enlarged vertical sectional view of part of the driving and control means shown in Fig. 7; and

Fig. 9 is a side elevation showing diagrammatically the manner in which the sheets are separated and forwarded in lapped relation from a supply of sheets.

Referring to the drawings, wherein like reference characters designate like parts throughout the several views, the various movable parts of the feeder, as well as certain stationary parts thereof, are all mounted on a frame comprised by front uprights 5 and rear uprights 6 at opposite sides of the feeder, the front uprights 5 having heads 7 bolted or otherwise suitably secured thereto and the rear uprights 6 having heads 8 bolted or otherwise suitably secured thereto (Figs. 1 and 2). The heads 7 and 8 are connected together by spaced side members 9 and 10 bolted or otherwise suitably secured thereto. The front heads 7 are connected together by stay shafts 11, 12 and 13 which are bolted or otherwise suitably secured to said heads, and the rear heads 8 are connected together by a stay shaft 14 bolted or otherwise suitably secured thereto.

Extending transversely of the feeder and driven from any suitable source of power is a shaft 15 each end of which is journalled in a bracket 16 (Fig. 2) bolted or otherwise suitably secured on the adjacent heads 7. The shaft 15 also extends through and is journalled in brackets 17 and 18 which are spaced inwardly from the front

heads 7 and secured in any suitable manner to said heads and to the stay shafts 12 and 13 extending therethrough. Fixed on each end of the shaft 15 and located in a suitable opening in the adjacent front head 7 is a worm 19 which meshes and drives a corresponding worm gear 20 also located in said opening.

The worm gears 20 are fixed on shafts 21 (Figs. 1 and 2) which extend longitudinally of the feeder near the top and at opposite sides thereof and are journalled in suitable bearings formed in the front heads 7 and in brackets 22 that are bolted or otherwise suitably secured to the side members 10. Fixed on the shafts 21 are sheaves 23 provided with teeth that are engaged by the links of chains 24 which pass over said sheaves and have corresponding ends attached as by couplings 25 to the side bars 26 of a pile elevator including said chains. The pile elevator also includes cross beams 27 which are engaged over the side bars 26 and adapted to receive and support a pile board 28 and pile of sheets 29 thereon.

The elevator may be lowered to load it, and raised to bring the top of the pile to proper position for feeding, by any suitable means for these purposes. Shaft 15 is then intermittently rotated in the usual manner by any well known means to raise the elevator step by step in order to maintain the top of the pile at the proper level as the sheets are fed therefrom in succession by means for this purpose hereinafter described. The construction of the pile elevator and its operation for purposes of loading and feeding sheets are well understood in the art and since the elevator per se forms no part of the present invention further description thereof is unnecessary. It is pointed out, however, that during step by step upward movement of the elevator imparted thereto as sheets are being fed from the top of the pile, the front of the pile is guided by pile guides 30 (Fig. 1) which are secured in any suitable manner on the feeder frame.

Referring now more particularly to Fig. 2, the drive for the feeder is preferably comprised by a driven jack shaft 31 which, in turn, is driven from any suitable source of power (not shown). One end of this jack shaft 31 is journalled in a suitable bearing formed in a gear guard 32 which is bolted or otherwise suitably secured to the adjacent front head 7. Disposed within the gear guard 32 and fixed on the jack shaft 31 is a bevel gear 33 which meshes with and drives a similar gear 34 also disposed within said guard and fixed on one end of a shaft 35 projecting therein. This shaft 35 extends transversely of the feeder and is journalled in suitable bearings in the front heads 7 and in the brackets 17 and 18. Fixed on the opposite end of the shaft 35 and driven thereby is a spur pinion 36 which meshes with and drives a spur gear 37 that is fixed on and drives a transversely extending cam shaft 38 which is journalled in suitable bearings in one of the front heads 7 and in the brackets 17 and 18. This cam shaft 38 is utilized to operate various parts of the feeder to be hereinafter described.

Fixed on the cam shaft 38 and disposed between the bracket 17 and the adjacent front head 7 is a bevel gear 39 (Figs. 1 and 2) which meshes with and drives a similar gear 40 that is fixed on the lower end of a vertical shaft 41 and serves to drive the same. This shaft 41 is journalled at the upper and lower ends thereof in suitable bearings formed on brackets 42 and 43, respectively, which are bolted or otherwise suitably secured to the adjacent front head 7. Fixed on the upper end of the vertical shaft 41 is a bevel gear 44 which meshes with a similar gear 45 that is fixed on and drives a second cam shaft 46. This cam shaft 46 extends longitudinally of the feeder at one side thereof and is journalled in suitable bearings formed on brackets 47 and 48 which are bolted or otherwise suitably secured to the adjacent front head 7 and the adjacent rear head 8, respectively.

The sheets are separated one after another from the top of the pile 29 at the rear and opposite sides thereof by sheet separating mechanisms preferably of the general type disclosed in the United States Patent No. 2,208,304 granted July 16, 1940 to Edwin W. Goodwin. Referring to Fig. 1, these sheet separating mechanisms are located adjacent the upper rear corners of the pile of sheets and each includes suction sheet separating means comprised by a conduit 49, an arcuate housing 50 connected therewith, and a hollow arcuate member 51 slidable in the housing 50 and provided on the lower end thereof with a rubber suction cup 52. Vacuum is created in the arcuate housings 50 at predetermined intervals to cause the suction cups 52 to grip opposite rear corners of the succesive sheets and lift the rear edge thereof above the level of the pile. For this purpose, the conduits 49 have connected therewith corresponding ends of flexible conduits 53 the opposite ends of which are connected in any suitable manner with a suitable valve mechanism (not shown) which, in turn, is connected with a vacuum pump (not shown) or other suitable source of vacuum.

The separated sheets are forwarded in succession relative to the top of the pile 29 by suction sheet forwarding devices indicated broadly at 54 (Fig. 1) that act to continuously form a stream of lapped sheets each partly disposed upon the succeeding sheet in overlapping relation therewith as shown in Fig. 9 of the drawings. These sheet forwarding devices 54 are preferably mounted, constructed and operated in the same manner as the suction sheet forwarding devices disclosed in the United States Patent No. 2,208,304 mentioned above. The sheet forwarding devices 54 are comprised by cylinders 55 and rubber suction cups 56 which are vacuum operated in opposite directions to engage and lift the rear portion of each separated sheet. The cylinders 55 are carried on the free ends of horizontal arms 57 which are pivotally connected to the lower ends of vertically extending parallel arms 58 and 59 that impart horizontal reciprocating motion to the suction sheet forwarding devices 54. The arms 58 are adjustably secured to a transversely extending rock shaft 60 which is journalled in suitable bearings formed in brackets 61 that are adjustably mounted on the side members 10 at opposite sides of the feeder. The arms 59 are rotatably mounted on a transversely extending shaft 62 that is secured in any suitable manner in the brackets 61.

Horizontal reciprocating motion is imparted to the suction sheet forwarding devices 54 by a barrel cam 63 which is keyed to and slidable along the cam shaft 46. The cam 63 is located between the arms of one of the brackets 61 through which the cam shaft 46 extends to provide for longitudinal adjustment of said cam with said bracket. Extending in the groove of the cam 63 is a roller 64 which is journalled on the free end of an arm 65 that is fixed on and rocks the rock shaft 60. It will thus appear that upon rocking of arm 65

and shaft 60 by cam 63 and through the connection of arms 58 and 59 by arms 57, said arms will be moved forwardly and rearwardly and the sheet forwarding devices 54 will move forwardly and rearwardly to take and forward the separated sheets successively and form a lapped stream thereof as previously pointed out.

Vacuum is created and broken in the sheet forwarding devices 54 at predetermined intervals such that when they are moved rearwardly they engage the topmost separated sheet and when they the moved forwardly they forward said sheet under and in lapped relation with a preceding forwarded sheet and there release said first named forwarded sheet. For this purpose, the cylinders 55 have connected therewith corresponding ends of flexible conduits 66 the opposite ends of which are connected in any suitable manner with a vacuum pump (not shown) or other source of vacuum through a suitable valve mechanism (not shown).

In the formation and advance of the stream of lapped sheets, each sheet gripped by the suction sheet forwarding devices 54 is forwarded thereby from the pile 29 under and in lapped relation with a preceding sheet to conveying means driven at slow speed, and preferably continuously, to enable lapping of the sheets thereon. As shown in Figs. 1, 2 and 8, this conveying means comprises a feed roller 67 and pressure rollers 68 cooperating with said feed roller to receive the forwarded sheets in lapped relation and advance said sheets to slow moving tapes 69 that convey a stream of the lapped sheets to a printing press or other machine with which the feeder is associated. The feed roller 67 extends transversely of the feeder and is journalled in suitable bearings in the brackets 17 and 18. The pressure rollers 68 are journalled on arms 70 adjustably secured on a shaft 71 which extend transversely of the feeder and is secured at opposite ends thereof in the brackets 17 and 18.

The front ends of the tapes 69 pass around a suitable roller or rollers (not shown), and the rear ends of said tapes pass around and are driven by a roller 72 having the same surface speed of rotation as that of the feed roller 67. The tape roller 72 extends transversely of the feeder and is journalled at opposite ends thereof in suitable bearings in brackets 73 which are bolted or otherwise suitably secured to the brackets 17 and 18. The upper reaches of the tapes 69 pass over an idler roller 74, and the lower reaches of said tapes pass around an idler roller 75 and tape tightening rollers 76. The idler rollers 74 and 75 extend transversely of the feeder and are journalled at opposite ends thereof in suitable bearings in the brackets 17 and 18, and the tape tightening rollers 76 are journalled on arms 77 which are adjustably secured to the stay shaft 13.

The feed roller 67, tape roller 72 and the tapes 69 are driven continuously and at slow speed from the cam shaft 38 by suitable gearing including a spur gear 78 (Fig. 2) that is fixed on and driven by said shaft. This spur gear 78 meshes with and drives a spur gear 79 that is fixed on and drives a short shaft 80 journalled in suitable bearings in the bracket 17 and the adjacent front head 7. Fixed on and driven by the short shaft 80 is a spur gear 81 which meshes with and drives an idler gear 82. This idler gear 82 is journalled on the turned down end 83 of a square bar 84 having its opposite end turned down as indicated at 85. The square bar 84 extends transversely of the feeder between the feed roller 67 and the tape roller 72 and is secured in any suitable manner against rotation in the brackets 17 and 18. The idler gear 82 meshes with and drives spur pinions 86 and 87 that are fixed on the outwardly projecting ends of the feed roller 67 and tape roller 72, respectively.

It will thus appear that the feed roller 67, the tape roller 72 and the tapes 69 are driven continuously and at slow speed through the described driving connections therefor with the cam shaft 38. In this manner, a stream of lapped sheets is formed at the feed and pressure rollers 67, 68 and slowly advanced by the tape roller 72 and tapes 69 toward the printing press or other sheet fed machine with the leading sheet of the stream uppermost. The sheets are guided in their movement from the feed roller 67 to the tape roller 72 by transversely spaced tongues or fingers (not shown) which bridge the space between said rollers and are adjustably secured to the square bar 84.

In accordance with the present invention improved sheet calipering means is provided which is particularly suited for measuring stream thickness as distinguished from sheet thickness and effects stopping of the feeder or otherwise provides for removing the excess sheets in the event an excess sheet or sheets are present at a predetermined point in the stream and at a predetermined time. Further, the sheet calipering operation is performed on the marginal side edges of the lapped sheets and as herein shown, may be performed at either side of the stream of sheets through the provision of duplicate sheet calipering mechanisms arranged at opposite sides of the feeder. These sheet calipering mechanisms indicated broadly at 88 and 89 (Fig. 2) are identical in construction and operation and a description of one of said mechanisms will therefore be sufficient for both of the same. Each sheet calipering mechanism is preferably mounted, constructed and operated as follows.

Engaged over the square bar 84 is a bracket 90 (Figs. 4 and 5) which extends upwardly between the feed roller 67 and the tape roller 72 and is held against displacement from said bar by a plate 91 which is bolted or otherwise suitably secured to the underside of said bracket. The bracket 90 and parts carried thereby hereinafter described may be adjusted laterally of the feeder along the square bar 84 in accordance with variations in width of the sheets handled in the feeder and may be secured in any desired position of adjustment by a thumb screw 92 or the like. Disposed between the feed roller 67 and the tape roller 72 and preferably beneath the path of travel of the sheets, is a rotary sheet calipering member 93. As herein shown, this sheet calipering member 93 is preferably in the form of a disc substantially equal in diameter to the diameter of the feed roller 67 and undercut as indicated at 94 to provide an abbreviated sheet engaging surface 95 preferably curved concentrically with the axis of rotation thereof.

The sheet calipering member 93 is preferably carried by the bracket 90 to enable lateral adjustment therewith, and for this purpose said member is provided with a long hub 96 (Fig. 5) which extends through and is journalled in a suitable bearing in said bracket. Endwise displacement of the sheet calipering member 93 from the bracket 90 is prevented by a collar 97 which is secured in any suitable manner on the outwardly projecting end of the hub 96. It will thus appear that due to the formation of the

sheet calipering member 93, only the surface 95 thereof will engage the sheets and for a part only of each revolution of said member as shown in Figs. 4 and 6, while the undercut portion 94 of the member will present no interference to the forwardly moving sheets during the remainder of each revolution of said member.

The sheet calipering member 93 is so operated that it makes only one complete revolution during each cycle of operation of the feeder and substantially at the same surface speed as the surface speed of forward travel of the sheets. This operation of the sheet calipering member 93 may be accomplished in various ways as, for example, by employing a relatively large disc having a circumference equal to the surface speed of travel of the sheets, undercut as described and driven continuously at cam shaft speed. However, as herein shown and to enable employment of a relatively small sheet calipering member, said operation is preferably accomplished as follows.

Secured to the feed roller 67 on the projecting end thereof opposite that carrying the spur pinion 86 is a spur pinion 98 (Figs. 2, 3 and 7) which meshes with and drives an idler gear 99 that is journalled on a stud 100 secured in any suitable manner in the bracket 18. This idler gear 99 meshes with and drives a spur pinion 101 having the same number of teeth as the spur pinion 98 and loosely mounted on a sleeve 102 (Fig. 8) provided on one end thereof with a circular head 103. The sleeve 102 is keyed, as indicated at 104 (Fig. 8) to one end of a shaft 105 which extends transversely of the feeder through the brackets 17 and 18 and through the members 93 of the sheet calipering mechanisms 88 and 89. The shaft 105 is journalled in suitable bearings in the brackets 17, 18, and provided longitudinally thereof with a keyway 106 (Fig. 5). Rotation is imparted to the sheet calipering members 93 by the shaft 105 through keys 107 which are secured in the hubs 96 of said members and engaged in and slidable along the keyway 106 in said shaft. It will thus appear that the brackets 90, the sheet calipering members 93 and the following described parts carried by each of said brackets may be adjusted laterally of the feeder in accordance with variations in width of the sheets handled in the feeder, and without disturbing the driving connections for shaft 105 with the members 93.

Engaged over the sleeve 102 and disposed on opposite sides of the spur pinion 101 are leather discs 108 (Fig. 8) which frictionally drive the shaft 105 through the medium of the circular head 103 of said sleeve and a flange 109 that is keyed to the sleeve 102, as indicated at 110. The flange 109 has sliding movement relative to the sleeve 102, and said flange, the leather discs 108, the spur pinion 101 and the head 103 are retained in frictional driving contact with each other by a spring 111 having one end engaging against the flange 109 and the opposite end engaging against a collar 112 adjustably secured on the sleeve 102. Endwise displacement of the sleeve 102 from the shaft 105 is prevented by a collar 113 secured in any suitable manner on the end of said shaft. It will thus appear that with the construction thus far described, the sheet calipering member 93 will be driven continuously by the feed roller 67 and at the same surface speed of rotation of the latter and the tape roller 72, and will rotate repeatedly bringing the sheet engaging surface 95 into and out of sheet calipering position during each cycle of operation of the feeder.

Mechanism is, therefore, provided to hold the sheet calipering member 93 against rotation and with the sheet engaging surface 95 thereof out of sheet calipering position until a succeeding sheet has been added to the stream of sheets and advanced sufficiently to dispose the leading edge thereof a short distance beyond sheet calipering position, and then to release said member for rotation a single revolution only, whereby the sheet engaging surface 95 is rotated once through sheet calipering position to caliper the added sheet together with the overlying sheet or sheets lapped therewith. This stopping and starting of the sheet calipering member 93 may be accomplished in any suitable manner and by any suitable means for this purpose, but as herein shown, is preferably accomplished by mechanism mounted, constructed and operated as follows.

Fixed on and rotated by the cam shaft 38 is a hub 114 having adjustably secured thereto, as by bolts 115, a cam disc 116 (Figs. 2, 3 and 7). The bolts 115 pass through arcuate slots 117 formed in the cam disc 116 and are threaded in suitable openings formed in the hub 114. The cam disc 116 is adapted to engage a roller 118 journalled on the arm 119 of a bell crank lever 120 the other arm of which is indicated at 121. The bell crank lever 120 is pivotally mounted on a pin 122 which is secured in any suitable manner in the bracket 18. Loosely mounted on the pin 122, between the bell crank lever 120 and the bracket 18, is an arm 123 having bolted or otherwise suitably secured to the underside thereof a detent 124. This detent 124 extends over the circular head 103 of sleeve 102 and is adapted to engage a shoulder 125 formed in the periphery of said head.

The arm 123 is connected with the bell crank lever 120 for rocking movement therewith by a bolt 126 which passes through a slot 127 formed in the arm 121 of said bell crank lever and is threaded in a suitable opening formed in the arm 123. The roller 118 is held in engagement with the cam disc 116 by a spring pressed rod 128 having one end pivotally connected as at 129 with the arm 123 and the opposite end guided in a block 130 which is bolted or otherwise suitably secured to the bracket 18. The spring 131 for rod 128 is mounted thereon between the block 130 and a collar 132 adjustably secured to said rod. It will thus appear that the arm 123, through the described connection therefor with the bell crank lever 120, is cam operated in one direction and spring operated in the opposite direction by the cam disc 116 and rod 128, respectively, to raise and lower the detent 124 into and out of engagement with the shoulder 125 on the circular head 103 once during each cycle of operation of the feeder.

It will further appear that when the detent 124 is engaged with the shoulder 125, the sheet calipering member 93 is held against rotation and in the normal position thereof shown in Fig. 1, the spur pinion 101 at this time slipping between the friction discs 108. However, when the high part of the cam disc 116 engages the roller 118 upon continued rotation of said cam disc, the bell crank lever 120 is rocked clockwise as viewed in Fig. 7, and the detent 124 is raised out of engagement with the shoulder 125 on head 103, thereby releasing the shaft 105 for rotation by the spur pinion 101 through the friction

discs 108. Thereupon the sheet calipering member 93 is rotated a single revolution only from the position thereof shown in Fig. 1 and through sheet calipering position as shown in Figs. 4 and 6, at which time said member is again stopped in the first named position upon engagement of shoulder 125 with detent 124 which, in the meantime, has been lowered into the path of said shoulder through continued rotation of the cam disc 116 and action of the spring pressed rod 128. The bolt and slot connection 126, 127 provides for adjustment of the detent 124 to insure proper engagement thereof with the shoulder 125 on head 103.

Cooperating with the sheet calipering member 93 and preferably disposed above the path of travel of the sheets, is a normally stationary caliper element 133 (Figs. 4, 5 and 6). This caliper element 133 may be of any suitable form and as herein shown is preferably in the form of a segment which is pivotally mounted on a pin 134 secured in any suitable manner in an arm 135. This arm 135 is, in turn, carried by the bracket 90 to enable lateral adjustment therewith, and for this purpose said arm is pivotally mounted on a bushing 136 (Fig. 5) which is secured in any suitable manner in said bracket. Threaded in a suitable opening in the free end of the arm 135 is an adjusting screw 137 which engages a stud 138 that is secured in any suitable manner in an extension 139 of the bracket 90. The screw 137 is provided with a knurled operating head 140, and said screw is held in adjusted positions by a pointed spring pressed pin 141 carried by the arm 135 and engaging in the teeth of the knurling on the head 140. The screw 137 is held in engagement with the stud 138 by a pull spring 142 having one end connected with the arm 135 and its opposite end connected with the extension 139. Rotation of the screw 137 in either direction will result in raising or lowering of the arm 135 and the caliper element 133 so that a space equal to the thickness of a single sheet or the thickness of a predetermined number of lapped sheets is left between said caliper element and the sheet calipering member 93 when the sheet engaging surface 95 of the latter is rotated into sheet calipering position.

The sheets are guided between the member 93 and the element 133 by upper and lower guide plates 143 and 144, respectively, which are spaced apart to provide adequate clearance for free forward travel of the sheets (Figs. 4, 5 and 6). The guide plate 143 is bolted or otherwise suitably secured to the extension 139 of bracket 90 and provided with a suitable opening 145 to receive the caliper element 133, and the guide plate 144 is bolted or otherwise suitably secured to the bracket 90 and provided with a suitable opening 146 to receive the sheet calipering member 93.

The caliper element 133 has fixed thereon and projecting laterally therefrom a pin 147 with which is engaged the forked end of an arm 148 (Figs. 4, 5 and 6). The arm 148 is keyed to a shaft 149 which is provided longitudinally thereof with a keyway 150 to enable lateral adjustment of said arm without disturbing the connection therefor with said shaft. This shaft 149 extends transversely of the feeder through the bushings 136 in the brackets 90 of the sheet calipering mechanisms 88, 89 and is journalled in suitable bearings in the brackets 17 and 18. Fixed on one end of the shaft 149 is an arm 151 (Figs. 2 and 3) having connected therewith one end of a pull spring 152. The opposite end of the spring 152 is connected with a collar 153 which is adjustably secured to a shaft 154 that extends transversely of the feeder and is fixed at opposite ends thereof in the brackets 17 and 18. The spring 152 normally tends to turn the shaft 149 in a clockwise direction as viewed in Fig. 4 so that the arm 148 and the caliper element 133 are normally disposed in the positions thereof shown in Fig. 4 determined by engagement of said caliper element with a pin 155 which is secured in and projects laterally from the arm 135.

Lateral adjustment of the arm 148 is accomplished with the bracket 90 and the hereinbefore described parts carried thereby, and for this purpose said bracket has secured therein and projecting laterally therefrom a pin 156 having bolted or otherwise suitably secured thereto a plate 157 which extends downwardly beyond the top and at the side of said arm.

Fixed on the shaft 149 and disposed adjacent the bracket 17 is a rearwardly extending arm 158 having bolted or otherwise suitably secured on the upper side thereof a detent 159 (Figs. 4, 5 and 6). This detent 159 is normally disposed in the position thereof shown in Fig. 4 to prevent rocking movement past the same of sheet feeder control means including an abutment 160 that is bolted or otherwise suitably secured to the free end of a downwardly and rearwardly curved arm 161. This arm 161 is fixed on one end of a stub shaft 162 which extends through and is journalled in a suitable bearing in a horizontally extending lug 163 of a bracket 164 that is pinned or otherwise suitably secured to the shaft 154. Fixed on the opposite end of the stub shaft 162 is a forwardly extending arm 165 having pivotally connected therewith as at 166 the lower end of a vertically disposed connecting link 167. The upper end of the connecting link 167 is pivotally connected, as at 168 (Fig. 2), with one arm 169 of a bell crank lever 170 the other arm of which is indicated at 171. This bell crank lever 170 is pivotally mounted, as at 172, on the bracket 42.

Journalled on the arm 169 of bell crank lever 170 is a roller 173 which is adapted to engage a cam 174 (Figs. 1 and 2) that is fixed on and rotated by the cam shaft 46. Also pivotally connected with the arm 169 of bell crank lever 170 is one end of a spring pressed rod 175 the opposite end of which is guided in a suitable opening in a block 176 which is secured in and projects laterally from the bracket 42. The spring 177 for rod 175 is mounted thereon between the block 176 and a collar 178 adjustably secured on said rod. Connected with the free end of the arm 171 of the bell crank lever 170 is a rod 179 (Fig. 2) which is connected with well known mechanism (not shown) for stopping or tripping the feeder in the event an abnormal condition arises in the feeding of the sheets.

It will thus appear that the bell crank lever 170, through engagement of abutment 160 with detent 159, is normally held against rocking movement by the cam 174 and rod 175. Under these conditions no movement will be imparted to the rod 179 and consequently normal feeding of the sheets in succession proceeds without interruption. When, however, the caliper element 133 is actuated as hereinafter described, the detent 159, through the described connections therefor with said caliper element, is rocked from the position thereof shown in Fig. 4 to the position thereof shown in Fig. 6. Under these condi-

tions the detent 159 is moved out of the path of movement of abutment 160 and the roller 173 on bell crank lever 170 is permitted to follow the low part of the cam 174 upon continued rotation thereof with the result that the rod 179 is actuated and the feeder stopping or tripping mechanism (not shown) is rendered effective thereby to stop or trip the feeder.

Means are provided for holding the detent 159 in actuated position as shown in Fig. 6 to prevent premature resetting of the same and the caliper element 133 until the roller 173 on bell crank lever 170 has moved into the low part of the cam 174 and the rod 179 is actuated to effect stopping or tripping of the feeder. Any suitable means may be provided for this purpose, but as herein shown said means is preferably comprised by a stop element in the form of a downwardly and forwardly curved arm 180 (Figs. 4, 5 and 6) which is pivotally mounted on a pin 181 that is secured in any suitable manner in the bracket 164. This arm 180 normally rests by gravity against the detent 159 which as shown in Fig. 5 projects laterally from the arm 158 for this purpose. It will thus appear that when the detent 159 is actuated as hereinafter described to the position thereof shown in Fig. 6, the arm 180 will immediately swing by gravity over the top of said detent into the path of return movement thereof, thus preventing resetting of the latter and the caliper element 133 prior to operation of the abutment 160 and the rod 179 through the described connections therefor with the cam 174.

Return movement of the arm 180 to its normal position shown in Fig. 4 may be accomplished in any suitable manner and by any suitable means for this purpose, but as herein shown, is accomplished manually as follows. Loosely mounted on the worm shaft 15 is a bell crank lever 182 (Fig. 1) having one arm 183 provided with a handle 184, and another arm 185. This arm 185 of bell crank lever 182 has pivotally connected therewith the forward end of a connecting rod 186 the rear end of which is pivotally connected with the arm 187 of a bell crank lever 188 that is pivotally mounted on the pin 181. The other arm 189 of bell crank lever 188 has secured thereon a pin 190 which projects laterally therefrom beneath a hook portion 191 of the arm 180. It will thus appear that when the handle 184 is moved downwardly (Fig. 1) the bell crank lever 188 will be moved in a clockwise direction (Figs. 1, 4 and 6), thus engaging the pin 190 with the hook portion 191 of arm 180 and lifting the latter out of the path of return movement of the detent 159. When the caliper element 133 and the detent 159 are again reset as shown in Fig. 4, the handle 184 is raised to its original position (Fig. 1) thereby lowering the pin 190 to permit the arm 180 to again rest by gravity against the detent 159 for subsequent operation thereof.

The operation of the feeder and the sheet calipering mechanisms is as follows. Assuming that the sheets are to be calipered on their left hand side marginal edges (Fig. 2) in which case the sheet calipering mechanism 88 will be employed and the other mechanism 89 will be moved along the bar 84 out of operating position on the right hand marginal edges of the sheets. Also, assuming that the surface speed of rotation of the feed roller 67 as well as the surface speed of travel of the tapes 69 is, for example, fifteen inches per cycle of operation of the feeder, and that sheets, for example, twenty-five inches long are being handled in the feeder. Under these conditions each sheet separated from the pile will be forwarded and added to the stream after the preceding sheet has been advanced fifteen inches resulting, in the case of the twenty-five inch sheet, in an underlap of ten inches and a normal stream thickness of two sheets. It will be understood that the extent of underlap decreases as the length of the sheets decreases, and increases as the length of the sheets increases, resulting in a variation in the normal thickness of the stream from two to probably four sheets within the range of the feeder. For example, in the handling of sheets thirty-five inches long the extent of underlap will be twenty inches with the result that the third sheet added to the stream will not only underlap the preceding or second sheet by twenty inches but will also underlap the first sheet by five inches thus forming a stream having a normal thickness of three sheets.

The various mechanisms of the feeder having been properly timed with relation to each other, and the caliper element 133 having been adjusted to provide clearance between the same and the sheet engaging surface 95 of the sheet calipering member 93 for the passage of a normal stream thickness only, for example, two sheets, the uppermost sheet of the pile is engaged by the sheet separating cups 52 and through telescoping action of the parts 50 and 51 said sheet is lifted and separated from the pile. At this time the sheet forwarding devices 54 have moved to their rearmost position and gripped the rear portion of the lifted separated sheet which is then released from the cups 52 by breaking of vacuum therein. The devices 54 now move forward carrying the separated sheet in the same direction therewith until the front edge of the sheet is delivered thereby between the feed roller 67 and the pressure rollers 68 under and in lapped relation with a previously forwarded sheet engaged between and being fed by said rollers.

The cups 56 of the sheet forwarding devices 54 are then released from the forwarded sheet by breaking of vacuum in said cups. The sheet forwarding devices 54 then move rearwardly to engage the next sheet which in the meantime has been separated from the pile so that there is continuously supplied to the rollers 67 and 68 a stream of lapped sheets which, in turn, is moved slowly and continuously by the tapes 69 to the printing press or machine that takes the leading uppermost sheets successively from the stream for performance of the printing or other operation thereon.

When the leading edge of each added sheet is disposed slightly beyond sheet calipering position as shown in Fig. 4 during forward movement thereof with the sheet lapped therewith from the rollers 67, 68 to the tapes 69, the high part of the cam 116 upon continued rotation thereof will then engage the roller 118 and rock the bell crank lever 120 clockwise as viewed in Fig. 7, thus raising the detent 124 out of engagement with the shoulder 125 on the head 103, and releasing the shaft 105 for rotation by the spur pinion 101 through the friction discs 108. Thereupon the sheet calipering member 93 is rotated one complete revolution and substantially at the same surface speed as the surface speed of travel of the lapped sheets, so that the surface 95 of said member is moved from the position shown in Fig. 1, through the sheet calipering position shown in Fig. 4, and back to its former original position, at which time the member 93 is again stopped

through subsequent lowering of the detent 124 upon continued rotation of the cam 116 and engagement of the shoulder 125 therewith. During rotation of the sheet calipering member 93 as aforesaid, the surface 95 of said member will engage the lapped sheets at substantially the same surface speed of travel thereof and lift said sheets toward the caliper element 133 as shown in Fig. 4.

If, during such engaging and lifting movement of the lapped sheets by the sheet calipering member 93, there is no additional sheet or sheet thickness present, the caliper element 133 and the detent 159 will remain stationary in the positions thereof shown in Fig. 4. In such event, the roller 173, due to engagement of the abutment 160 with the detent 159, cannot follow the low part of the cam 174 to rock the bell crank lever 170 and rod 179, and the normal feeding of the sheets in succession will thus proceed without interruption.

Assuming now that two sheets are forwarded simultaneously by the sheet forwording devices 54 under and in lapped relation with the preceding sheet as shown in Fig. 6. In this event, and with an extra thickness in the stream at the calipering position, the caliper element 133 will, upon rotation of the sheet calipering member 93 and engagement of the surface 95 thereof with the abnormal stream thickness, be rotated counter-clockwise about its pivotal axis 134 through frictional contact of the forwardly moving sheets therewith as shown in Fig. 6 of the drawings. Such rotation of the caliper element 133 causes the pin 147 thereon to rotate the arm 148 and shaft 149 counter-clockwise and thus rock the detent 159 downwardly out of the path of movement of the abutment 160, whereupon the arm 180 swings by gravity over the top of said detent to hold the same in lowered position, all as shown in Fig. 6 of the drawings.

When the detent 159 is lowered as aforesaid, the roller 173 may then follow the low part of the cam 174 upon continued rotation thereof, thus rocking the bell crank lever 170 counter-clockwise (Fig. 2) and actuating the rod 179. Actuation of the rod 179 results in operation of the feeder stopping or tripping mechanism (not shown) which is connected with said rod, and stopping of the feeder.

Upon stopping of the feeder, the added and excess sheets are removed from the stream, at which time the handle 184 is moved downwardly to raise the pin 190 and thus lift the arm 180 out of the path of return movement of the detent 159. The feeder is then again started by suitable means for this purpose, whereupon the roller 173 on bell crank lever 170 is engaged by the high part of the cam 174 upon rotation thereof, thereby rocking said bell crank lever clockwise as viewed in Fig. 2 and returning the rod 179 and the abutment 160 to their original positions shown in Figs. 2 and 4, respectively. The detent 159 and the caliper element 133 are then returned to their original positions, all as shown in Fig. 4, through clockwise rotation of the shaft 149 effected by the spring 152. The handle 184 is then raised to its original position (Fig. 1) to lower the pin 190 and enable subsequent operation of the arm 180.

In order to insure performance of the calipering operation on all sizes of sheets capable of being handled in the feeder, it is necessary, in some cases, to vary the time when the sheet calipering operation is effective. In the feeding of sheets that are slightly longer than the surface speed or forward movement of the sheets for each cycle of operation of the feeder as, for example, sheets eighteen inches long, the extent of underlap will be, in the case of a fifteen inch surface speed, three inches which is insufficient to enable effective performance of the calipering operation on a predetermined number of lapped sheets. In this event, performance of the sheet calipering operation is delayed until the tail of the preceding lapped sheet has moved beyond the sheet calipering position, whereupon the calipering operation is effective on a single sheet or sheet thickness instead of a normal stream thickness of two sheets.

This delayed sheet calipering operation may be accomplished by loosening the bolts 115 and turning the cam disc 116 clockwise (Fig. 7) on the hub 114, the cam shaft 38 being driven in the direction of the arrow indicated in said figure. It is to be understood that when the sheet calipering operation is performed on a single sheet or sheet thickness as above described, the caliper element 133 must also be adjusted to provide a space for the free passage of a single sheet or sheet thickness only between said element and the surface 95 of the sheet calipering member 93.

The above described delayed sheet calipering operation is equally important where a normal stream thickness of three of four sheets is formed by sheets that are slightly longer than twice or three times, respectively, the surface speed or forward movement of the sheets for each cycle of operation of the feeder. A condition then exists where the tail of a first sheet slightly laps with the head of a third or fourth sheet. For example, in the feeding of sheets thirty-three inches long, the third sheet added to the stream will not only underlap the second sheet by eighteen inches but will also underlap the first sheet by three inches. This short overlapping of the first sheet with respect to the third sheet is insufficient to enable effective performance of the calipering operation on the normal stream thickness of three sheets, therefore the sheet calipering operation is delayed as hereinbefore described until the tail of the first sheet has moved slightly beyond the sheet calipering position, in which event the sheet calipering operation will be effective on two sheets instead of the normal stream thickness of three sheets. Of course, the caliper element 133 must also be adjusted accordingly to provide a space for the free passage of only two sheets instead of three sheets.

It will be noted that the calipering member 93, or particularly the calipering sheet engaging surface 95 thereof, is normally disposed out of sheet calipering position and is brought into calipering position at the proper time by cooperative action of the cam 116 releasing the circular head 103 and the means for rotating the calipering member 93. Any suitable calipering member is contemplated which rotates in one direction only and has means for bringing its calipering surface into calipering position at the proper time to assure that a sheet or a predetermined number of sheets are passing between the calipering member and the calipering element. The calipering mechanism described herein is particularly suited for positioning in a limited space, such as between a feed roller 67 and a tape roller 72 spaced relatively near thereto, because the intermittent bringing of the calipering surface into calipering position permits the calipering member to be of relatively small size.

The calipering mechanism described herein has general applicability, although it is particularly

suited for stream feeding of sheets because the mechanism can be set for calipering, say, two sheets and will not trip when a normal stream thickness of three sheets passes thereby. In other words, the calipering mechanism can be set for a certain number of lapped sheets and not trip the sheet feeder control mechanism when there are more sheets at some particular point, as described hereinbefore. This result is accomplished by removing the lower calipering surface away from calipering position and bringing it to calipering position only when calipering of the sheets is desired.

While the present invention is herein illustrated and described in connection with sheet feeders for advancing sheets in lapped relation to a printing press or other instrumentality, it is without modification equally adaptable to sheet feeders wherein the sheets are advanced singly one after another in spaced relation to a printing press or other instrumentality.

Further, a sheet calipering mechanism constructed and operated in accordance with the present invention is capable of arrangement and operation at any desired point in a stream of lapped sheets between the front and rear ends thereof.

It is therefore to be expressly understood that, as indicated by the above description, the term "predetermined number" as hereinafter employed is intended to apply to a single sheet or sheet thickness as well as plural sheets or a plural sheet thickness, and that the present invention is not limited to the embodiment or location thereof herein illustrated and described or otherwise than by the terms of the appended claims.

What we claim is:

1. In a sheet calipering mechanism for sheet feeders: a normally stationary caliper element; a rotary sheet calipering member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said sheet calipering member, said sheet calipering member having an abbreviated sheet engaging surface normally disposed out of sheet calipering position; and means for rotating the sheet calipering member at predetermined intervals in one direction only to move the sheet engaging surface thereof through sheet calipering position.

2. In a sheet calipering mechanism for sheet feeders: a normally stationary saliper element; a rotary sheet calipering member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said sheet calipering member, said sheet calipering member having an abbreviated sheet engaging surface normally disposed out of sheet calipering position; and means for rotating the sheet calipering member at predetermined intervals one complete revolution only to move the sheet engaging surface thereof through sheet calipering position once only, for each feeding cycle.

3. In a sheet calipering mechanism for sheet feeders: a normally stationary caliper element; a rotary sheet calipering member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said sheet calipering member, said sheet calipering member having an abbreviated sheet engaging surface normally disposed out of sheet calipering position; and means for rotating the sheet calipering member at predetermined intervals one complete revolution only and at a speed substantially equal to the surface speed of the passing sheets whereby the sheet engaging surface thereof is moved through sheet calipering position once only for each feeding cycle and substantially at sheet speed.

4. In a sheet calipering mechanism for sheet feeders: a normally stationary caliper element; a rotary sheet calipering member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said sheet calipering member, said sheet calipering member having an abbreviated sheet engaging surface normally disposed out of sheet calipering position; means for rotating the sheet calipering member at predetermined intervals one complete revolution only and at a uniform speed substantially equal to the surface speed of the passing sheets whereby the sheet engaging surface thereof is moved through sheet calipering position once only for each feeding cycle and substantially at sheet speed; and adjustable means for controlling the operation of the sheet calipering member and for adjusting the time of the sheet calipering operation thereof.

5. In a sheet calipering mechanism for sheet feeders having a sheet feeder control mechanism: a normally stationary caliper element adapted to be operatively connected with the sheet feeder control mechanism; a rotary sheet calipering member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said sheet calipering member, said sheet calipering member being normally disposed out of sheet calipering position; and means for rotating the sheet calipering member in one direction only and to bring the calipering member into sheet calipering position.

6. In a sheet calipering mechanism for sheet feeders having a sheet feeder control mechanism: a normally stationary caliper element adapted to be operatively connected with the sheet feeder control mechanism; a rotary sheet calipering member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said sheet calipering member, said sheet calipering member being normally disposed out of sheet calipering position; means to bring said sheet calipering member into cooperating calipering position with the stationary caliper element at predetermined intervals; and means for rotating the sheet calipering member in one direction only.

7. In a sheet calipering mechanism for sheet feeders having a sheet feeder control mechanism: a normally stationary caliper element adapted to be operatively connected with the sheet feeder control mechanism; a rotary sheet calipering member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said sheet calipering member, said sheet calipering member being normally disposed out of sheet calipering position; means to bring said sheet calipering member into cooper-

ating calipering position with the stationary caliper element at predetermined intervals; means for rotating the sheet calipering member in one direction only; and adjustable means for controlling the operation of the sheet calipering member and for adjusting the time of the sheet calipering operation thereof.

8. In a sheet feeder: the combination of means for advancing a stream of lapped sheets toward a machine to be fed; and sheet calipering means cooperatively associated with said stream advancing means and comprising a normally stationary caliper element; a rotary sheet calipering member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of lapped sheets at a time passes between the same and said sheet calipering member, said sheet calipering member having an abbreviated sheet engaging surface normally disposed out of calipering position; and means for rotating the sheet calipering member at predetermined intervals one complete revolution only to move the sheet engaging surface thereof through calipering position once only during each feeding cycle and at a time when a predetermined number of lapped sheets are in position for the calipering operation.

9. In a sheet feeder: the combination of means for forwarding sheets in lapped relation one after another from a pile or supply of sheets; means for advancing a stream of the lapped sheets toward a machine to be fed; and sheet calipering means cooperatively associated with said stream advancing means and comprising a normally stationary caliper element; a rotary sheet calipering member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of lapped sheets at a time passes between the same and said sheet calipering member, said sheet calipering member having an abbreviated sheet engaging surface normally disposed out of calipering position; and means for rotating the sheet calipering member in timed relation with each forwarded sheet one complete revolution only so that the sheet engaging surface thereof is moved through calipering position once only during each feeding cycle and at a time when a predetermined number of lapped sheets including the forwarded sheet are in position for the calipering operation.

10. In a sheet calipering mechanism for sheet feeders: a normally stationary caliper element; a rotary sheet calipering member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said sheet calipering member, said sheet calipering member having an abbreviated sheet engaging surface; and means for rotating the sheet calipering member one complete revolution only during each cycle of operation of the feeder and at a uniform speed substantially equal to the surface speed of the passing sheets whereby the sheet engaging surface thereof is rotated through sheet calipering position once only in each feeding cycle substantially at sheet speed and always in the direction of travel of the sheets.

11. In a sheet calipering mechanism for sheet feeders: a normally stationary caliper element; a rotary sheet calipering member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said sheet calipering member, said sheet calipering member having an abbreviated sheet engaging surface; means for rotating the sheet calipering member; means for normally holding the sheet calipering member against rotation by said first named means and with the sheet engaging surface thereof normally disposed out of sheet calipering position; and means for operating said holding means at predetermined intervals to release the sheet calipering member and enable rotation of the latter by said first named means whereby the sheet engaging surface thereof is rotated at predetermined intervals through sheet calipering position.

12. In a sheet calipering mechanism for sheet feeders: a normally stationary caliper element; a rotary sheet calipering member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said sheet calipering member, said sheet calipering member having an abbreviated sheet engaging surface; means for rotating the sheet calipering member at a speed equal to the surface speed of the passing sheets; means for normally holding the sheet calipering member against rotation by said first named means and with the sheet engaging surface thereof normally disposed out of sheet calipering position; and means for controlling the operation of said holding means whereby the sheet calipering member is released at predetermined intervals to enable rotation of the same by said first named means and movement of the sheet engaging surface thereof at sheet speed through sheet calipering position.

13. In a sheet calipering mechanism for sheet feeders: a normally stationary caliper element; a rotary sheet calipering member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said sheet calipering member, said sheet calipering member having an abbreviated sheet engaging surface; means for rotating the sheet calipering member; means for normally holding the sheet calipering member against rotation by said first named means and with the sheet engaging surface thereof normally disposed out of sheet calipering position; and means for controlling the operation of said holding means whereby the sheet calipering member is released for rotation at a predetermined time during each cycle of operation of the feeder and stopped after the same has been rotated one complete revolution so that the sheet engaging surface of said member is moved through sheet calipering position at a predetermined time and once only during each feeding cycle.

14. In a sheet calipering mechanism for sheet feeders: a normally stationary caliper element; a rotary sheet calipering member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said sheet calipering member, said sheet calipering member having an abbreviated sheet engaging surface; means for rotating the sheet calipering member at a speed equal to the surface speed of the passing sheets; means for normally holding the sheet calipering member against rotation by said first named

means and with the sheet engaging surface thereof normally disposed out of sheet calipering position; and means for controlling the operation of said holding means whereby the sheet calipering member is released for rotation at a predetermined time during each cycle of operation of the feeder and stopped after the same has been rotated one complete revolution so that the sheet engaging surface of said member is moved through sheet calipering position at sheet speed once only during each feeding cycle.

15. In a sheet calipering mechanism for sheet feeders: a normally stationary caliper element; a rotary sheet calipering member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said sheet calipering member, said sheet calipering member having an abbreviated sheet engaging surface; means including a friction slip connection for rotating the sheet calipering member at a uniform speed equal to the surface speed of the passing sheets; a detent for normally holding the sheet calipering member against rotation by said first named means and with the sheet engaging surface thereof normally disposed out of sheet calipering position; and cam means for controlling the operation of said detent whereby rotation of the sheet calipering member is effected at a predetermined time during each cycle of operation of the feeder and for a single revolution only so that the sheet engaging surface thereof is moved through sheet calipering position once only during each feeding cycle and at sheet speed.

16. In a sheet calipering mechanism for sheet feeders: a normally stationary freely movable caliper element; a driven member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said driven member; sheet feeder control means; means for normally rendering said sheet feeder control means ineffective, said means being associated with said caliper element and rendered operative on actuation thereof to render the sheet feeder control means effective; and means for holding said last named means in operated position to prevent premature resetting thereof.

17. In a sheet calipering mechanism for sheet feeders: a normally stationary freely movable caliper element; a driven member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said driven member; reciprocating sheet feeder control means; means for normally preventing reciprocation of said sheet feeder control means, said means being associated with said caliper element and rendered operative on actuation thereof to enable reciprocation of the sheet feeder control means; and means for holding said last named means in operated position to prevent resetting thereof prior to operation of said sheet feeder control means.

18. In a sheet calipering mechanism for sheet feeders: a normally stationary pivotally mounted caliper element; a driven rotary calipering member spaced from and cooperating with said caliper element to effect rotation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said calipering member; reciprocating sheet feeder control means; a rotatable member normally disposed in the path of movement of said sheet feeder control means to prevent reciprocation thereof, said member being connected with said caliper element and rendered operative on rotation thereof to enable reciprocation of the sheet feeder control means; and a pivotally mounted element normally removed from the path of movement of said last named member and movable into the path of return movement thereof to prevent resetting of the same and said caliper element prior to operation of said sheet feeder control means.

19. In a sheet calipering mechanism for sheet feeders: a normally stationary freely movable caliper element; a driven member spaced from and cooperating with said caliper element to effect actuation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said caliper element; normally ineffective sheet feeder control means associated with the caliper element and rendered effective thereby on actuation thereof; and means for holding the caliper element in actuated position to prevent premature resetting thereof.

20. In a sheet calipering mechanism for sheet feeders: a normally stationary pivotally mounted caliper element; a driven rotary calipering member spaced from and cooperating with said caliper element to effect rotation thereof in the event more than a predetermined number of sheets at a time is passed between the same and said calipering member; reciprocating sheet feeder control means including an abutment; a rotatably mounted detent normally disposed in the path of movement of said abutment to prevent reciprocation of sheet feeder control means, said detent being connected with said caliper element and adapted to be rotated thereby out of said path to enable reciprocation of the sheet feeder control means; and a pivotally mounted stop element normally resting by gravity against said detent and movable thereover immediately upon rotation thereof to hold the same in operated position.

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