H. C. LA BATT.

SHEET FEEDING MACHINE.

APPLICATION FILED MAR. 27, 1905. RENEWED JAN. 18, 1911.

1,003,473. Patented Sept. 19, 1911.

3 SHEETS—SHEET 1.

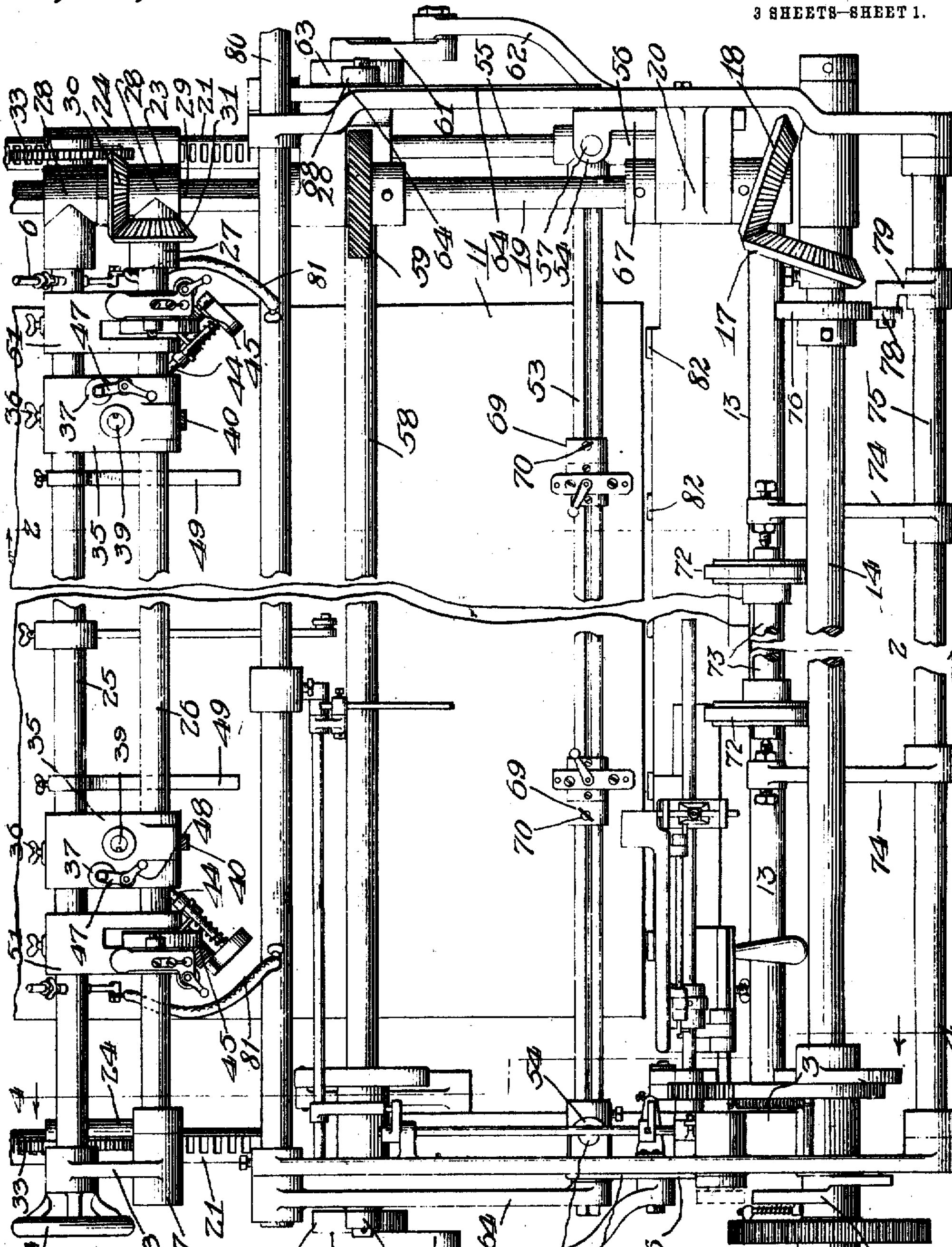

Fig. 1

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3 SHEETS—SHEET 2.

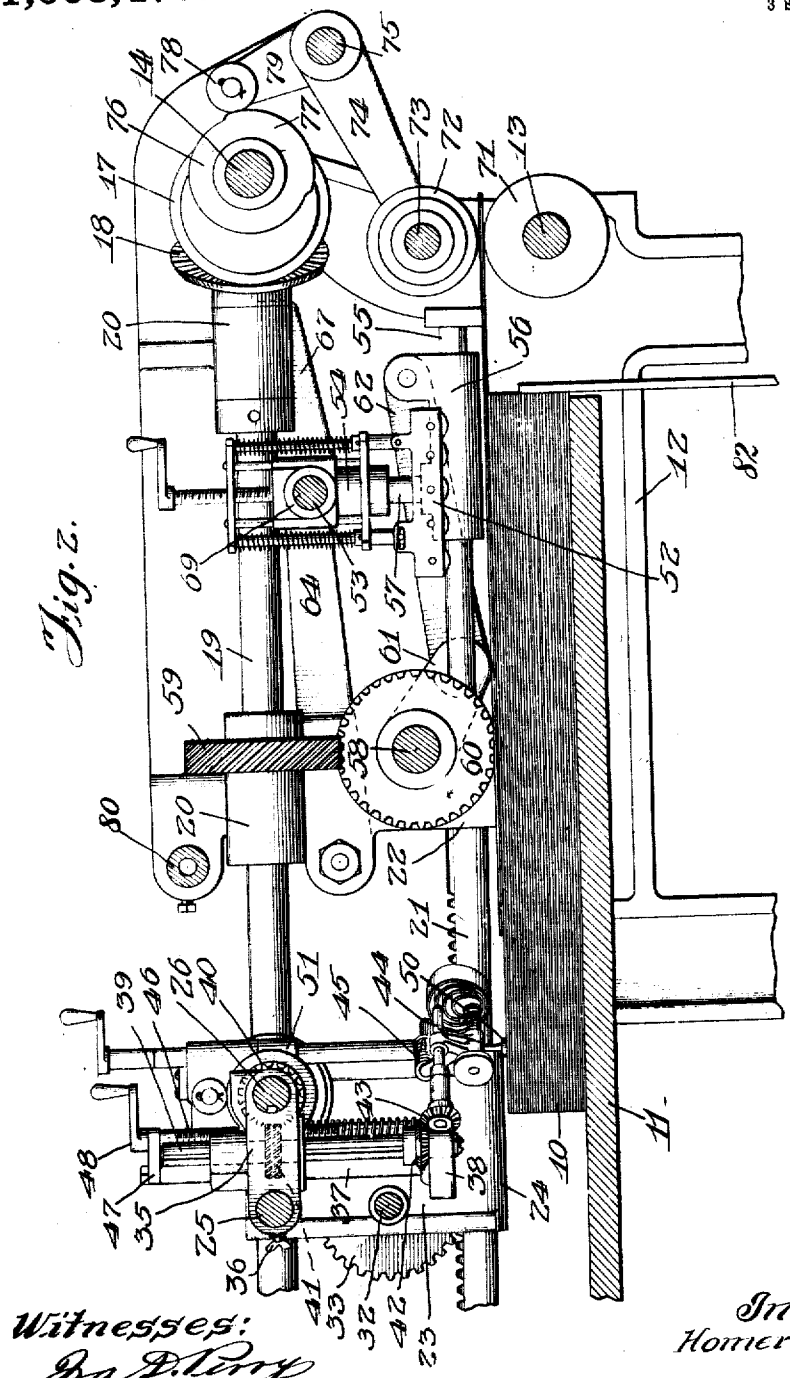

Fig. 2.

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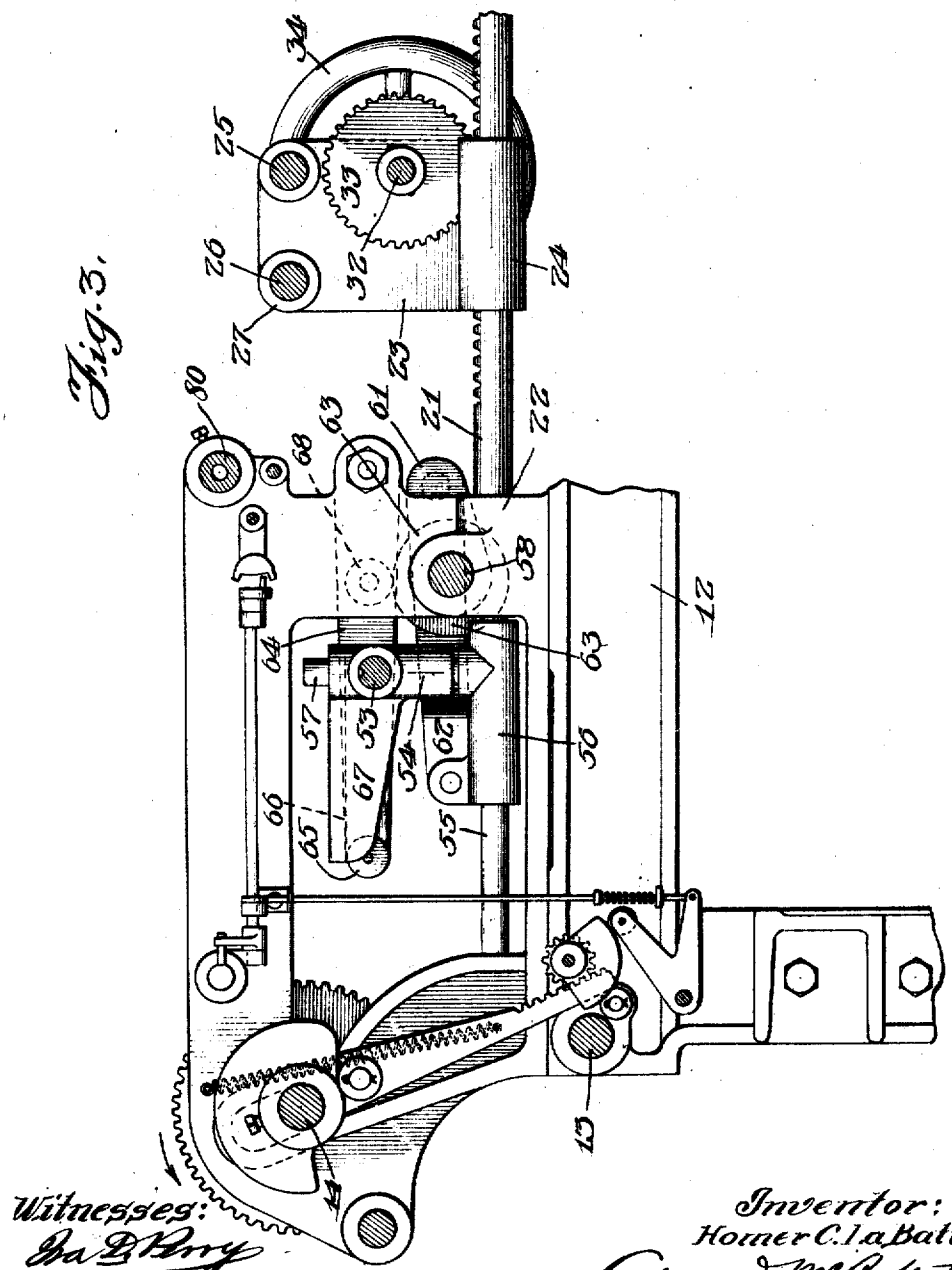
3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

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SHEET-FEEDING MACHINE.

1,003,473. Specification of Letters Patent. Patented Sept. 19, 1911.

Application filed March 27, 1905, Serial No. 252,261. Renewed January 18, 1911. Serial No. 603,401.

To all whom it may concern:

Be it known that I, HOMER C. LA BATT, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Sheet-Feeding Machines, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to improvements in paper handling machines, such as paper feeding machines, adapted to successively feed sheets of paper one at a time from a pile or stack to an associated printing, ruling, folding or like machine.

The objects of the invention are to generally improve and simplify machines of this class, particularly with reference to the means for operating the buckling and front feeding devices.

Other objects as well as the advantages of the invention will be apparent from the accompanying specification.

The invention consists of the combinations, organizations and arrangements of parts hereinafter described and then pointed out in the appended claims.

In the accompanying drawings—Figure 1 is a plan view of the machine; Fig. 2 is a section on the line 2—2 of Fig. 1; Fig. 3 is a section on the line 4—4 of Fig. 1.

The stack or pile of sheets 10, shown in Fig. 2, to be fed to the printing press, folder or other associated machine is carried by an adjustable table 11, any suitable means being provided for automatically adjusting the table to keep the top sheet within operative relation to the buckling and front feeding devices hereinafter described. This table is mounted on a suitable supporting frame 12 which forms the base or support upon which the various members of the machine are carried. A main driving shaft 13 is journaled on the frame at the front thereof and motion may be communicated to this shaft from any suitable source of power. A second shaft 14 is journaled on the frame above the shaft 13 and receives motion from the latter through the medium of a suitable train of gearing 15 and a clutch 16, located at one side of the machine, which may be of any suitable character, such as that described and claimed in an application for patent filed by me March 27, 1905, Serial No. 252,262. A miter gear 17 is fixed to the shaft 14 at the opposite side of the machine and meshes with and drives a miter gear 18 fixed on a longitudinal shaft 19 journaled in bearings 20 on one side of the frame. A pair of guide rods 21 extend rearwardly from the risers 22 at the opposite sides of the frame and form the support for an adjustable carriage which carries the buckling devices employed to separate the sheets at their rear edges. This carriage comprises opposite brackets 23, having sleeves 24 through which the guide rods extend, and a pair of cross rods 25 and 26 which are mounted at their ends on the brackets 23. The rod 26 is journaled in bearings 27 and is adapted to rotate, as hereinafter described, while the rod 25 is stationary. The shaft 19 extends through and is journaled in bearings 28 on the bracket 23 at that side of the machine and is provided with a key-way 29, as shown. A bevel gear 30 is carried by the shaft 19, being located between the bearings 28, and by reason of the key-way is rotated by the shaft 19 but is adapted to slide along the same when the carriage is adjusted, as hereinafter explained. The bevel gear 30 meshes with and drives a similar gear 31 fixed on the adjacent end of the rod or shaft 26, as shown in Fig. 1.

The guide rods 21 are in the form of rack bars. A shaft 32 is suitably journaled at its ends on the brackets 23, Figs. 2 and 4, and is provided with pinions 33 which mesh with the rack bars. At one end the shaft 32 is provided with suitable means for turning the shaft, such as the hand wheel 34. It is obvious that by turning the hand wheel 34 the pinions 33 will travel along the racks moving the carriage uniformly at both ends and preventing angular movement of the same and consequent binding on the guide rods. While the hand wheel 34 is preferably employed for adjusting the carriage it is obvious that it may be adjusted by merely pushing or pulling the same. When this is done the coöperating rack bars and pinions will cause the carriage to move uniformly.

The bucklers which are mounted on the carriage are adapted to operate upon the

rear or side edges of the sheets and raise the top sheet from the pile for the initial separation. Two of such bucklers are employed and may be of any suitable character. In the present instance each buckler comprises, as shown in Figs. 1 and 2, a carrier 35 which is in the form of a block provided at its ends with openings for the cross rods 25 and 26 and adapted to slide longitudinally upon the cross rods, it being held at any desired point of adjustment, according to the dimensions of the sheets, by means of a set screw 36 adapted to impinge against the stationary rod 25. A vertical rod 37 is adapted to slide through the carrier 35 and has fixed to its lower end a bracket 38. Parallel with the rod 37 is a shaft 39 which is journaled on the carrier. This shaft receives motion from the rod or shaft 26 through the medium of a worm gear 40 splined on such rod so as to be capable of being moved along the same, and which cooperates with a worm gear 41, shown in dotted lines in Fig. 2, splined on the shaft 39 in such manner as to permit of vertical movement of the shaft when the buckler is adjusted to properly position the same with reference to the table 11. The lower end of the shaft 39 is journaled on the bracket 38 and is provided with a miter gear 42 with which engages a companion gear 43 fixed to a horizontal shaft 44 also journaled on the bracket 38. The shaft 44 carries a suitable buckling pad 45 which is disposed parallel with the shaft 44 so that as such shaft is rotated the pad will be moved about the axis of the shaft to buckle the sheet. The pad is adjusted vertically by means of a screw rod 46 which is journaled at its upper end on a plate 47 fixed to the upper end of the rod 37 and engages a suitable threaded opening (not shown) in the carrier 35. The screw rod 46 is provided with a crank 48 by means of which the screw rod 46 may be turned. By turning this crank the rod 37 will be raised or lowered, thereby raising or lowering the bracket 38 and consequently the buckling pad, while by loosening the set screws 36 the bucklers may be adjusted laterally. Sheet holders 49 against which the top sheet is buckled by the rotating pads 45 are adjustably mounted on the rod 26 and extend in front of the bucklers, as shown in Fig. 1.

Associated with each buckling pad 45 is a presser foot 50 which is carried by a block 51 adjustably mounted on the rods 25 and 26. These presser feet are adapted to press upon and hold the pile of sheets with sufficient force to prevent the pile from being crowded or pushed forward under the pressure of the front feeding devices, hereinafter described, when the latter are acting to deliver the top sheet, but which are automatically actuated to decrease the pressure on the pile during the operation of the rear bucklers 45 to permit the withdrawal of the corners of the top sheet from under the presser feet when the sheet is buckled, as more fully described in an application filed by me December 18, 1903, Serial No. 185,624.

The sheets after the initial separation of the buckling pads are fed forward by the front feeding devices or feet 52. The front feeding devices 52 may be of any suitable character, such as that shown, and are carried by a transverse rod 53 the ends of which are fixed to vertical sleeves 54. At each side of the machine is a guide rod 55 on which reciprocates a carrier 56 from which extends vertically a post 57. The sleeves 54 receive the posts 57 and are adapted to move vertically thereon. A shaft 58 is journaled on the risers 22 and motion is communicated to the shaft through the medium of a worm wheel 59 fixed on the shaft 19 and engaging a gear 60 on the shaft 58. The ends of the shaft 58 are provided with crank arms 61 and links 62 connect these crank arms with the carriers 56. The ends of the shaft 58 are also provided with cams 63. Levers 64 are pivoted to the risers 22 at one side of the cams 63 and extend beyond the opposite side where they are provided with antifriction rollers 65 which engage the under faces of flanges 66 formed on brackets 67 extending from the sleeves 54. The levers 64 are provided with antifriction rollers 68 with which cooperate the cams 63. The front feeding devices are mounted on the rod 53 by means of sleeves 69 which are adapted to slide along the rod to properly position such devices, being held in adjusted position by set screws 70. By means of the mechanism described, the feet 52 have imparted thereto a vertical and a horizontal movement, the latter movement being accomplished through the medium of the crank arms 61 which reciprocate the carriers 56, while owing to the engagement of the cams 63 with the rollers 68 the levers 64 are rocked on their pivots to move the sleeves 54 vertically. These movements are so timed that as the sheet is buckled at the rear by the pads 45 the feeders are drawn rearwardly and then lowered into engagement with the top sheet. The feeders are next moved forward moving the top sheet with them to the feeding off mechanism hereinafter described, and are then elevated out of engagement with the sheet and retracted

Both the front feeding devices 52 and the rotating bucklers 45 have motion communicated to them from the shaft 14, primarily through the medium of the gears 17 and 18. These gears are of such character as to impart a slow movement to the buckling devices during the period when they are actu-

ally buckling the sheet and a quick movement during the period when the buckling devices are inoperative that is moving into position to buckle the next sheet; and also to impart a quick forward movement to the front feeding devices while they are actually delivering the sheet and a slow return movement of such front feeding devices. This is accomplished through the medium of what may be termed an eccentric gear connection, although any connection for attaining this desired end may be employed. In the present instance the gear 17 consists of a inter gear which is angularly disposed with reference to the shaft 14 and eccentric thereto. The gear 18 is of similar character being disposed at an angle to the shaft 19 and eccentric thereto. By reference to Fig. 1 it is obvious that when the teeth of the gear 17 at the major radius of such gear engage the teeth of the gear 18 at the minor radius of the latter the shaft 19 will be rotated at the highest speed, gradually decreasing in speed as the minor radius of the gear 17 engages the major radius of the gear 18 and then gradually increasing again. The parts are so timed in their action that the effective operation of the bucklers and front feeding devices takes place in alternation; that is to say when the shaft 19 is driven at its slowest speed the bucklers are acting to buckle the sheet, and at the same time the front feeding devices are moved slowly rearward, and while the bucklers are rotating quickly into position to buckle the next sheet the front feeding devices are moved quickly forward to deliver the previously buckled top sheet.

The sheet ejecting mechanism, which is designed to eject the sheets from the machine and to which the sheets are delivered by the front feeding devices 52, comprises in the present instance the coöperating disks 71 and 72. The disks 71 are fixed on the main drive shaft 13 and revolve continuously. The disks 72 are fixed on a shaft 73 the ends of which are pivoted to the free ends of arms 74 which are fixed to a transverse rock shaft 75 suitably journaled on the frame of the machine. A disk 76 having a concentric cam projection 77 for a portion of its periphery is fixed to the shaft 14 and is adapted to coöperate with an antifriction roller 78 on an arm 79 fixed to the shaft 75. The disk 76 is so timed in its movement that just after the sheet enters between the ejecting disks 71 and 72 and after the front feeding devices 52 are raised from the stock the cam portion of the disk 76 moves out of engagement with the roller 78, thereby permitting the disks 72 to move, as by gravity, to press the sheet against the disks 71 with sufficient pressure to cause the ejection of the sheet. After the sheet is ejected the cam portion 77 moving into engagement with the roller 78 lifts the disks 72 and holds them elevated until the next sheet is fed forward. By reason of the variable speed of the front feeding devices, that is the quick forward movement thereof and slow return, the sheets are moved forward quickly and ample time is given during the slow return to permit the ejecting disks to discharge the sheet.

The apparatus for supplying the air to separate the sheets after the buckling thereof, may be of any suitable character. In the present instance this air is supplied through the medium of a cross pipe 80 mounted on the machine and to which are connected the nozzle tubes 81. The slats 82 located at the front of the machine are employed to keep the front edge of the stack of sheets in register.

Having described my invention what I claim is—

1. In a sheet feeding machine, the combination with a paper table and ejecting mechanism, of rear buckling devices and front feeding devices driven at variable speed, the front feeding devices moving at relatively high speed to deliver the sheets to the ejecting mechanism and at lower speed while the sheets are being acted on by the ejecting mechanism.

2. In a sheet feeding machine, the combination with a paper table, of rear buckling devices and front feeding devices driven at variable speed and acting in alternation, the rear buckling devices being driven at relatively low speed to buckle the sheets and the front feeding devices at relatively high speed to feed the sheets after the buckling operation.

3. In a sheet feeding machine, the combination with a paper table, of rotating bucklers and reciprocating front feeding devices, and means for moving the said bucklers and front feeding devices at variable speed.

4. In a sheet feeding machine, the combination with a paper table, of rotating bucklers and reciprocating front feeding devices acting on the sheets in alternation, and means for moving the said bucklers and feeding devices at variable speed.

5. In a sheet feeding machine, the combination with a paper table, of rotating bucklers and reciprocating front feeding devices acting in alternation and moving at variable speed, the bucklers moving at relatively low speed during the buckling operation and the front feeding devices at relatively high speed while delivering the sheets.

6. In a sheet feeding machine, the combination with a paper table, of rotating bucklers and reciprocating front feeding devices acting in alternation and moving at variable speed, the buckling devices being rotated at relatively low speed to buckle the sheets and at relatively high speed while returning to

buckling position and the front feeding devices having a relatively quick forward movement to feed the sheets after the buckling operation and a relatively slow return movement.

7. In a sheet feeding machine, the combination with a paper table, of rear bucklers and front feeding devices, and means for moving the front feeding devices at relatively high speed while acting on the sheets and at relatively low speed during the intervals between such action.

8. In a sheet feeding machine, the combination with a paper table and ejecting mechanism, of rear bucklers for separating the sheets, front feeding devices for delivering the sheets after separation to the ejecting mechanism, and means for moving the front feeding devices at relatively high speed to feed the sheets to the ejecting mechanism and at relatively slow speed during the return movement thereof and while the sheets are being ejected.

9. In a sheet feeding machine, the combination with a paper table and ejecting rolls, of rear bucklers for separating the sheets, reciprocating front feeding devices for delivering the sheets after separation to the ejecting rolls, and means for moving the front feeding devices forward at relatively high speed in engagement with the sheets to deliver them to the ejecting rolls and for retracting such devices at relatively low speed out of engagement with the sheet while the sheets are being ejected.

10. In a sheet feeding machine, the combination with a paper table, a rear shaft, rotating bucklers actuated from such shaft, front feeding devices acting in alternation with the bucklers, a second shaft, connections between the latter shaft and the front feeding devices to reciprocate the latter and also move them into and out of engagement with the sheets, and means for rotating the shafts at variable speed, whereby the bucklers are moved at low speed during the buckling operation and at high speed while returning to buckling position and the front feeding devices are advanced at high speed during the feeding operation and retracted at low speed.

11. In a sheet feeding machine, the combination with a paper table and a frame having rearwardly extending guides, of a carriage comprising brackets movable on the guides and cross rods on the brackets, rotating bucklers carried by the carriage and receiving motion from one of the rods, horizontal guide rods on the frame, carriers sliding on the guide rods and having vertical posts, a cross bar slidably mounted at its ends on the posts and provided with feet, a cross shaft provided with crank arms, links connecting the crank arms with the carriers, cams on the cross shaft, pivoted levers with which the cams coöperate and adapted to move the cross bar on the posts, a longitudinal shaft for driving the buckler moving rod and the cross shaft, and means for driving the longitudinal shaft at variable speed.

12. In a sheet feeding machine, the combination with a paper table, of rear bucklers and front feeding devices, a shaft, connections between the shaft and the said bucklers and front feeding devices, and an eccentric gear connection for imparting variable movement to the said shaft.

13. In a sheet feeding machine, the combination with a paper table, of bucklers for separating the sheets and front feeding devices for feeding the sheets after separation, a shaft rotating at uniform speed and provided with a gear, a drive shaft for transmitting motion to the bucklers and front feeding devices and having an eccentric gear meshing with the other gear.

14. In a sheet feeding machine, the combination with a paper table, of rotating bucklers for separating the sheets, front feeding devices, a shaft, connections between such shaft and the bucklers and front feeding devices, a drive shaft, and an eccentric miter gear connection between the shafts.

15. In a sheet feeding machine, the combination with a paper table, of rotating bucklers and reciprocating front feeding devices acting in alternation, a shaft, connections between the shaft and the bucklers and front feeding devices, a drive shaft, and intermeshing miter gears between the shafts and each of which is disposed eccentrically and at an angle to its respective shaft.

16. In a sheet feeding machine, the combination with a paper table, of rear rotating bucklers for separating the sheets and reciprocating feet acting in alternation therewith for feeding the sheets after separation, a pair of transverse shafts, connections between one of said shafts and the bucklers and connections between the other shaft and the feet, a longitudinal shaft for driving the transverse shafts, a drive shaft, and eccentric angularly disposed miter gears connecting the latter shaft and the longitudinal shaft.

17. In a sheet feeding machine, the combination with a frame provided with parallel guides consisting of rack bars, a transverse carriage provided with rotating bucklers and having brackets slidable on the guides, pinions engaging the rack bars, a shaft journaled on the carriage to which the pinions are fixed, and means for communicating motion to the bucklers irrespective of the adjustment of the carriage.

18. In a sheet feeding machine, the combination with a frame provided with parallel

guides consisting of rack bars, a transverse carriage provided with rotatable bucklers and having brackets slidable on the guides, a shaft journaled on the carriage for imparting motion to the bucklers and having a gear fixed thereto, a longitudinal shaft having a gear splined thereon and engaging the former gear, pinions engaging the rack bars, and a shaft journaled on the carriage to which the pinions are fixed.

In testimony whereof I affix my signature in presence of two witnesses.

HOMER C. LA BATT.

Witnesses:

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