

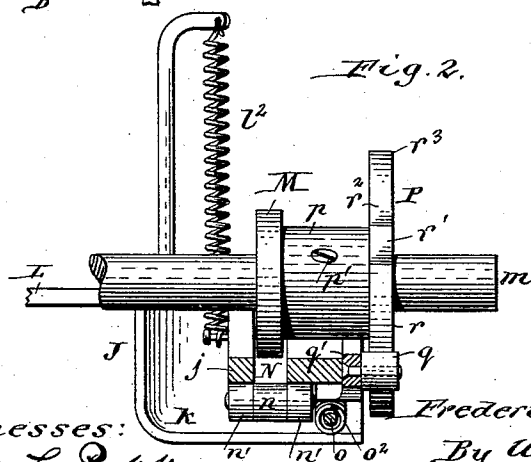
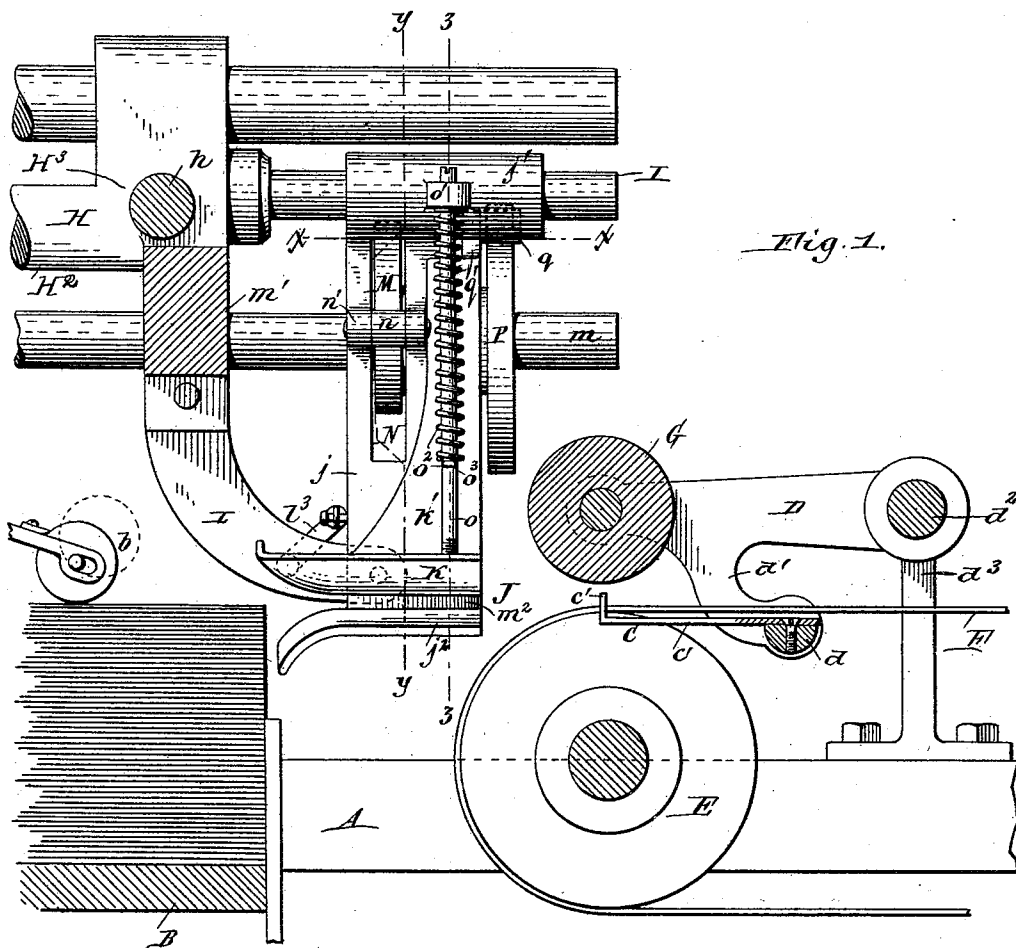
(No Model.)

4 Sheets—Sheet 1.

F. HART.
PAPER FEEDER.

No. 487,526.

Patented Dec. 6, 1892.



Witnesses:
 Theo. L. Popp
 J. T. Clough.

Frederick Hart, Inventor:
By Wilhelm & Bonner,
Attorneys.

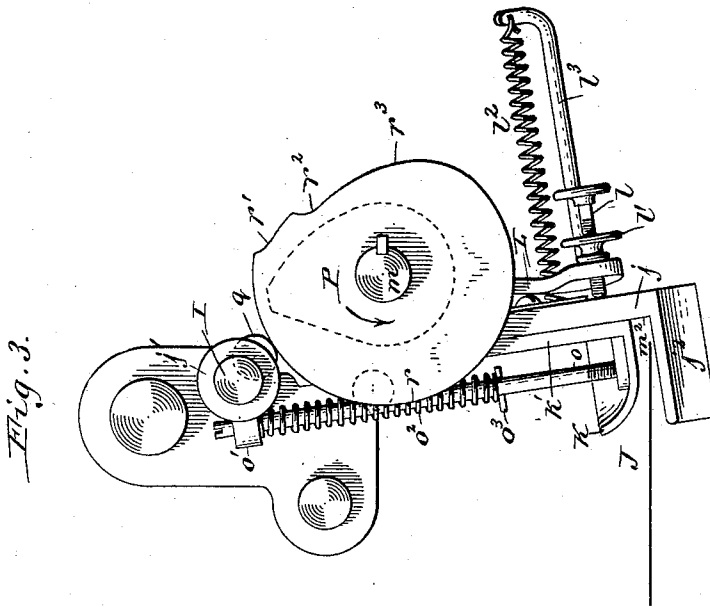
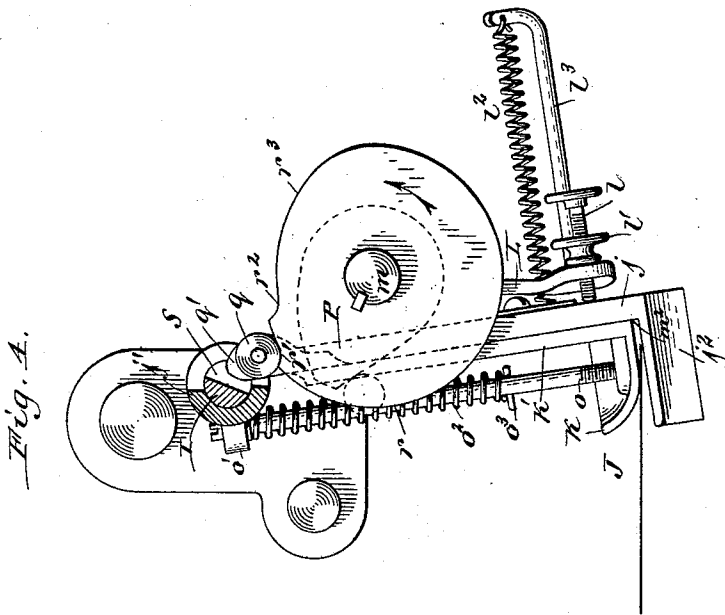
(No Model.)

4 Sheets—Sheet 2.

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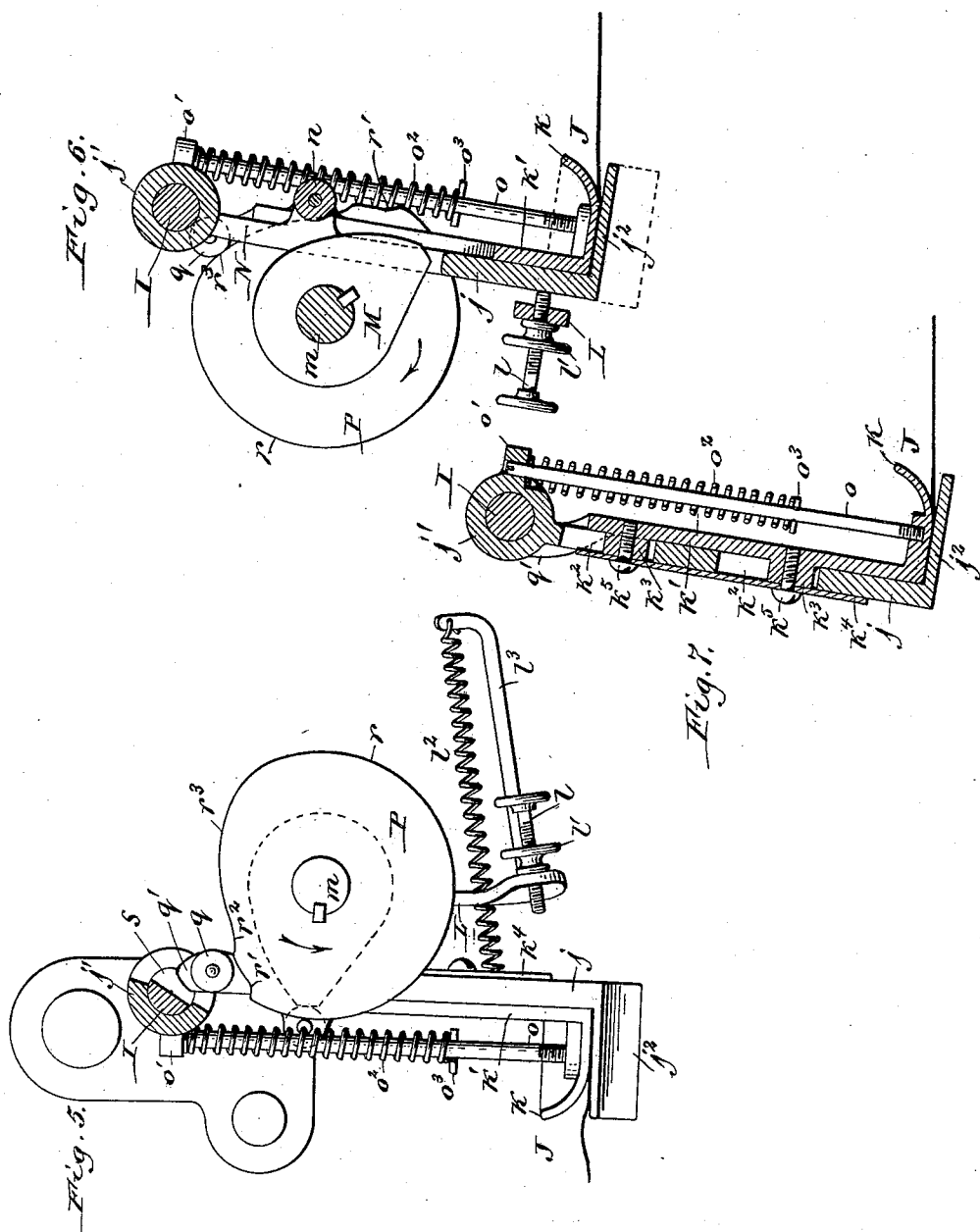
(No Model.)

4 Sheets—Sheet 3.

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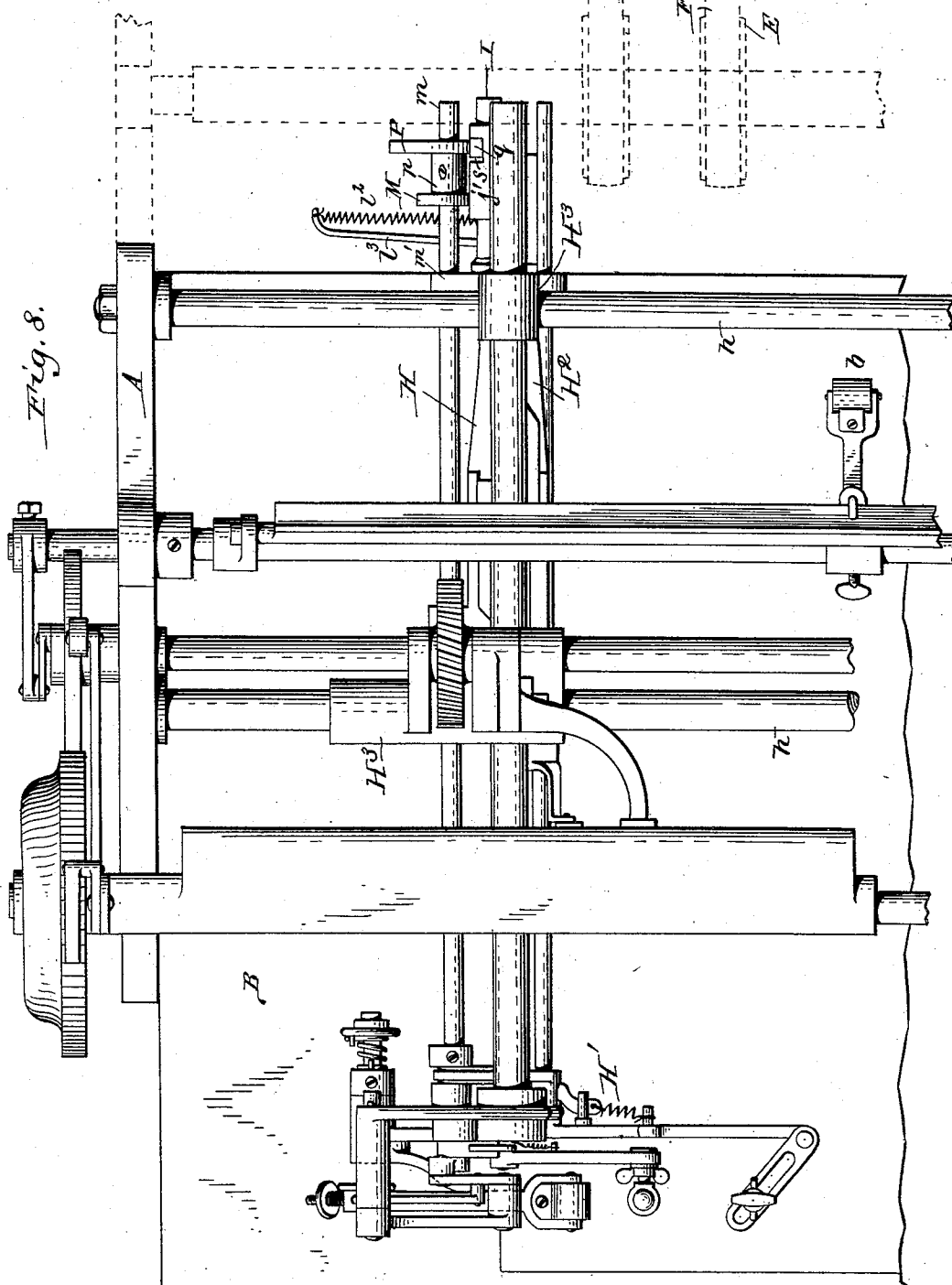
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UNITED STATES PATENT OFFICE.

FREDERICK HART, OF POUGHKEEPSIE, ASSIGNOR TO D. H BURRELL & CO.,
OF LITTLE FALLS, NEW YORK.

PAPER-FEEDER.

SPECIFICATION forming part of Letters Patent No. 487,526, dated December 6, 1892.

Application filed June 8, 1891. Serial No. 395,500. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK HART, a subject of the Queen of Great Britain, residing at Poughkeepsie, in the county of Dutchess and State of New York, have invented a new and useful Improvement in Paper-Feeders, of which the following is a specification.

This invention relates to an automatic side-registering mechanism which is designed principally for use in automatic paper-feeders which feed sheets of paper successively from a pile to a printing-press, ruling, or other machine, but which can be used in folding and other machines in which it is desirable to place sheets in correct register.

The object of my invention is to produce a registering device or gripper which will operate faster and more correct than those used heretofore.

In the accompanying drawings, consisting of four sheets, Figure 1 is a longitudinal sectional elevation of my improved side-registering device applied to an automatic paper-feeding machine. Fig. 2 is a horizontal section in line *xx*, Fig. 1. Fig. 3 is a rear elevation of one of the side-registering grippers and connecting parts, showing the gripper in its normal retracted position. Fig. 4 is a similar elevation, partly in section, of the gripper, showing the jaws of the latter partly closed. Fig. 5 is a similar view showing the gripper moved inwardly and gripping the sheet. Fig. 6 is a vertical transverse section of the gripper in line *yy*, Fig. 1, showing the same viewed from the front and in its retracted normal position preparatory to releasing the sheet. Fig. 7 is a similar section of the gripper in line *zz*, Fig. 1, showing the same gripping the sheet. Fig. 8 is a fragmentary plan view of an automatic paper-feeding machine having my improved side-registering device applied to the frame of the buckling mechanism.

Like letters of reference refer to like parts in the several figures.

A A represent the side frames of a paper-feeder, and B the horizontal table which supports the pile of paper and rises between the side frames as the sheets of paper are fed from the top.

b represents the pushing-out fingers which bear upon the paper in their forward movement, and whereby the sheets are fed from the

pile against the front-registering or drop guides C. At the end of the forward stroke of the pushing-out fingers the latter are raised from the paper and return in an elevated position to the place of beginning and are then again lowered upon the paper. Each of the drop-guides C consists of a short vertical stop *c*, against which the front end of the sheet strikes, and a horizontal portion *c'*, which is attached to a transverse bar *d*, supported at its outer ends on lugs *d'* *d'*, formed on the lower side of rock-arms D D. The latter are secured to a transverse rock-shaft *d*², journaled in bearings *d*³ on the side frames. E represents the front tape-rollers, and F the tapes, which pass around the front tape-rollers and thence forwardly with their upper portions over the drop-guide bar *d* to rollers on the printing-press or other machine to which the sheets are fed.

The front tape-rollers are rotated in the proper direction from any suitable moving part of the paper-feeder. An intermittent movement is imparted to the drop-guides C toward and from the upper portions of the tapes by the rock-shaft *d*². In the normal position of the guides the stops *c* thereof are arranged across the carrying-line of the upper portions of the feed-tapes and arrest the forward movement of the sheet as the latter is fed from the pile by the pushing-out fingers.

G represents a transverse pressure-roller arranged above the front tape-rollers adapted to bear on the upper side of the sheet of paper. The pressure-roller G is mounted in bearings formed in the rock-arms D D, which impart an intermittent oscillating movement to the roller in unison with the drop-guides. The latter are preferably arranged with their stops *c* vertically in line with the axis of the front tape-rollers when in a normal position for registering, so as to reduce the friction between the sheet and tapes during the registering operation to a minimum. After the sheet has been registered the drop-guides descend below the tapes to clear the path of the sheet and the pressure-roller presses the sheet against the tapes, whereby the sheet is seized and carried from the pile to the printing-press or other machine. The upper edges of the drop-guides are arranged as closely as possible to the lower side

of the pressure-roller and allow the sheet to pass freely between the guides and the pressure-roller in order to prevent the sheet from being disturbed during the brief interval between the dropping of the guides and the engaging of the sheet between the pressure-roller and the tapes.

H represents the frame which supports the parts of the side-registering mechanism and which is preferably the same frame which supports the sheet-buckling mechanism H' of the automatic paper-feeder. This supporting-frame consists of a longitudinal bar H², which is provided at opposite ends with sleeves H³. The latter are adjustably mounted on transverse rods *h h*, connecting the side frames of the machine, thereby rendering the buckling mechanism and side-registering mechanism capable of transverse adjustment in the machine at the same time. For a detailed description of this frame I refer to Patent No. 434,629, granted to me August 19, 1890.

I represents an arbor which carries the gripper J, by which the side of the sheet is registered. This arbor is arranged lengthwise of the machine and secured with its front end to the rear side of the supporting-frame H.

j represents a depending rock-arm provided at its upper end with an eye *j'*, which is hung loosely on the arbor I and carrying at its lower end a fixed gripper-jaw *j*², which extends inwardly.

k represents the upper jaw of the gripper, which is capable of moving toward and from the lower jaw and which clamps the sheet of paper between said jaws. The upper gripper-jaw is formed at the lower end of a movable supporting plate or bar *k'*, arranged on the inner side of the rock-arm *j*. The latter is provided with two longitudinal guide-slots *k*² *k*³, which receive lugs *k*³ *k*³, formed on the outer side of the supporting-plate.

*k*⁴ represents a fastening-plate which bears against the outer side of the rock-arm and is secured to the lugs of the upper gripper-plate by screws *k*⁵ *k*⁵, thereby guiding and permitting a limited lengthwise movement of the upper gripper-jaw upon the rock-arm.

L represents a stop-arm whereby the outward movement of the rock-arm is limited. This stop-arm is secured to the under side of the frame H and projects rearwardly. The rear end of the stop-arm is provided with an adjusting-screw *l*, which forms an adjustable stop, against which the outer side of the rock-arm rests and which permits the backward movement of the gripper to be adjusted.

l' represents a jam-nut arranged on the adjusting-screw, whereby the latter is clamped after adjustment.

*l*² represents a spring whereby the rock-arm is yieldingly held against the adjusting-screw of the stop-arm. This spring is secured with one end to the rock-arm and with its opposite end to an outwardly-extending bracket *l*³, secured to the stop-arm.

M represents a cam whereby the gripper is

moved inwardly transversely to the path of the sheet to be registered. This cam is mounted on a longitudinal shaft *m*, arranged parallel with the arbor I and below the same and journaled in bearings *m'* on the main supporting-frame H. This shaft is preferably the same shaft which actuates the parts of the buckling mechanism H'; but the cam M may be rotated from any other source.

The inner upright face *m*² of the rock-arm *j*, adjacent to the lower gripper-jaw, serves as the side-registering stop or guide, against which the side of the sheet of paper is registered. The cam M moves the gripper inwardly with the jaws open, so that the side-registering stop strikes the lateral edge of the sheet and the spring *l*² returns the closed gripper, carrying the sheet to its outer or registering position, thereby imparting a transversely-oscillating movement to the gripper. The rock-arm is provided with an upright slot N, through which the cam M extends and bears against an antifriction-roller *n*, extending across the front side of said slot. This roller is journaled in lugs *n' n'*, formed on the inner side of the rock-arm.

o represents an upright rod whereby the upper jaw is depressed and yieldingly held in contact with the lower jaw. This rod is secured with its lower end to the upper side of the upper jaw and slides with its upper end in a perforated lug *o'*, formed on the eye of the rock-arm.

*o*² represents a tension-spring which surrounds the rod and bears with its lower end against a pin *o*³, secured to the latter, while its upper end bears against the lug *o'* of the rock-arm.

P represents a rotating cam, whereby the upper jaw of the gripper is intermittently raised from the lower jaw and the gripper is opened. This cam is mounted on the shaft *m* in rear of the cam M, both cams being preferably connected by a sleeve *p*, formed integral with both cams and secured to the shaft *m* by a set-screw *p'*. The face of the cam P bears against an antifriction-roller *q*, pivoted to the side of an ear *q'*, formed on the upper portion of the upper jaw-supporting plate and arranged on the rear side of the rock-arm. The face of the cam P is provided with a concentric portion *r*, which forms the greater portion of the face, a shallow depression *r'* at the trailing end of the concentric portion, a deeper depression *r*², following the shallow depression, and an inclined or cam portion *r*³, leading from the deep depression to the beginning or advancing end of the concentric portion. When the concentric portion of the cam engages against the roller *q* of the upper jaw-supporting plate, the latter is raised to its highest position and the jaws of the gripper are separated to their fullest extent to receive the sheet of paper from the paper-feeding machine, as represented in Figs. 1 and 3. After the sheet of paper has been fed between the gripper-jaws the cam P, in ro-

tating in the direction of the arrow, presents its shallow depression r' underneath the roller q , which permits the upper jaw to descend a short distance and reduce the space between the jaws, as represented in Fig. 4. The gripper is now moved transversely forward by the cam M , so that the registering-stop m^2 of the rock-arm strikes the edge of the sheet. The space between the jaws of the gripper is reduced to such an extent preparatory to its forward movement that the portion of the sheet of paper lying between the jaws during the inward movement of the latter is prevented from curling or buckling. If the jaws would close upon the buckled portion of the sheet, the edge of the latter would become wrinkled and the sheet could not be correctly registered.

While the gripper is being moved inwardly by the actuating-cam M , the jaw-opening cam P is rotating and presents its deep depression underneath the roller q at the same time that the gripper reaches the limit of its inward movement, as represented in Fig. 6. This permits the upper jaw to descend freely and grip the sheet against the lower jaw. The actuating-cam M now releases the rock-arm carrying the gripper, and the former is moved quickly back against the stop-arm by the spring ℓ . During this entire backward movement the gripper-jaws retain a firm grip upon the sheet of paper and carry it laterally to the registering-point, as represented in Figs. 6 and 7. The moment the gripper reaches the limit of its outward movement the inclined portion of the jaw-opening cam P engages against the roller q , as represented in Fig. 6, and raises the upper jaw, thereby releasing the sheet of paper. The roller finally reaches the concentric portion of the cam which holds the roller and the upper jaw connected therewith in their highest position during a sufficient period of time to feed another sheet between the jaws by the pushing-out fingers of the paper-feeder.

The portions of the arbor I and of the eye of the rock-arm which are adjacent to the roller q are cut away to form a recess, which enables the roller q and the ear supporting the same to move freely upward and closely approach the center of the arbor, thereby reducing the compound movement of the roller caused by the oscillating movement of the rock-arm and the rectilinear movement of the upper jaw-plate and enabling the face of the jaw-opening cam P to be fitted more easily.

The operation of side-registering a sheet is as follows: In feeding the sheet by the pushing-out fingers from the pile against the drop-guides the lateral edge of the sheet passes between the jaws of the gripper, the entrance between them being facilitated by opening the jaws wide, and also by the flaring form of the receiving front portions of the jaws, as shown in the drawings. After the sheet has been fed from the pile squarely against the

drop-guides the pushing-out fingers are raised from the sheet and returned in an elevated position to the place of beginning. After the sheet has been so front-registered the rotation of the jaw-opening cam P allows the upper jaw to descend so as to partly close the gripper. The latter is moved forward in this partly-closed position by the actuating-cam M , so that the registering-stop m^2 strikes the side edge of the sheet of paper before it has reached the inward limit of its movement and carries the side edge inwardly a short distance and buckles the same slightly beyond the gripper. At the end of its forward movement the gripper is closed upon the sheet by the continued movement of the cam P , which releases the upper jaw and permits the tension-spring to close the same. After the sheet is thus seized the actuating-cam M releases the rock-arm and allows the spring ℓ to draw the rock-arm back against the adjusting-screw of the stop-arm, whereby the sheet is placed in correct side register. After the gripper has returned to this normal or outer position the continued revolution of the cam P causes it to raise the upper jaw, thereby releasing the sheet. The next instant the drop-guides descend and the pressure-roller bears on the sheet, which causes the tapes to carry the sheet in correct front and side register from the pile to the printing-press or other machine to which the sheets are fed. The extent of the inward movement of the gripper is such as to bring the lateral edges of the sheet in contact with the side-registering guide m^2 under the usual variations with which the sheets are fed from the pile. The variously-placed sheets are all seized firmly and drawn laterally by the gripper and brought into register with a definite line. This registering-line can be easily regulated while the machine is in operation by simply turning the adjustable screw-stop l in the proper direction. It is desirable to place this stop as near the lower end of the gripper-arm as possible, in order to avoid any vibration of the gripper when it strikes said adjusting-stop, thereby avoiding faulty side registering of the sheets. By effecting the adjustment of the oscillating movement directly in rear of the gripper lost motion and the liability of inaccurate side registering of the sheets which results therefrom are avoided.

By placing the side-registering mechanism and drop-guides directly in rear of the pile of paper the sheet is registered while the greater portion of the sheet still remains lying on the pile and before the sheet has attained any considerable speed in being fed off the pile.

As represented in the drawings, the side-registering mechanism is secured directly to the rear of the supporting-frame H , which latter also supports the buckling mechanism H' of the paper-feeder. This enables the buckling mechanism and side register to be adjusted laterally simultaneously and maintains

the same in their proper relative positions at all times.

The buckling mechanism is preferably constructed and arranged as described and shown in Letters Patent No. 434,629, granted to me August 19, 1890; but any other suitable buckling mechanism may be employed if desired.

I claim as my invention—

1. The combination, with a rock-arm provided with a fixed lower gripper-jaw and an upright registering-face at the rear end of said jaw, of a sliding gripper-jaw arranged above said fixed jaw and in front of said registering-face and capable of movement on said rock-arm toward and from the fixed jaw, substantially as set forth.

2. The combination, with the rock-arm provided with a lower fixed jaw and an upper jaw capable of movement toward and from the fixed jaw, of a spring which tends to press the movable jaw down upon the fixed jaw and a rotating cam which releases the movable jaw and permits the spring to close it upon the fixed jaw after the sheet has entered between the jaws and which raises the movable jaw from the fixed jaw, thereby releasing the sheet when the rock-arm has reached the registering position on its outward stroke, substantially as set forth.

3. The combination, with the rock-arm provided with a lower fixed jaw and a supporting-plate which is provided with the other jaw and which is capable of movement toward and from the fixed jaw, of a rotating cam which actuates the supporting-plate of the movable jaw and which has its working face arranged to control the position of the movable jaw during the various positions of the rock-arm, and a spring which tends to press the movable jaw upon the fixed jaw, substantially as set forth.

4. The combination, with the rock-arm provided with a lower fixed jaw and an upper jaw capable of movement toward and from the fixed jaw, of a spring which tends to press the movable jaw down upon the fixed jaw, a rotating cam which releases the movable jaw and permits the spring to close it upon the fixed jaw after the sheet has entered between the jaws and which raises the movable jaw, thereby releasing the sheet when the rock-arm has reached the registering position on its outward stroke, and a rotating cam whereby the rock-arm is oscillated, substantially as set forth.

5. The combination, with the rock-arm provided with a recess at its upper end and an arbor supporting said rock-arm and provided with a recess adjacent to the recess in the rock-arm, of a fixed jaw secured to the lower end of the rock-arm, a movable jaw arranged above the fixed jaw, a movable plate arranged on the rock-arm and supporting the movable jaw, an ear formed on the supporting-plate and extending into the recesses of the rock-arm and arbor, a roller arranged in said recesses and pivoted on said ear, and a cam en-

gaging with said roller, substantially as set forth.

6. In a gripper having a forward and backward movement, the combination, with the fixed jaw and the movable jaw having a movement toward and from said fixed jaw, of a cam provided in its face with a concentric portion, a shallow depression and a deep depression, whereby the jaws are held wide open when receiving the sheet of paper, nearly closed during their forward movement, entirely closed during their backward movement, and opened at the limit of their backward movement, substantially as set forth.

7. The combination, with the rock-arm provided with a fixed jaw and a movable jaw, of a cam whereby the rock-arm is moved forward, a spring whereby the rock-arm is returned, and an adjustable stop which projects beyond the cam and whereby the return movement of the rock-arm is limited, substantially as set forth.

8. The combination, with the rock-arm provided with a roller and a fixed jaw, of a movable jaw having a movement toward and from the fixed jaw, a stop-arm provided with an adjusting-screw which limits the backward movement of the rock-arm, a rotary cam adapted to bear against the roller of the rock-arm, a bracket secured to the stop-arm, and a spring yieldingly connecting the rock-arm and the bracket, substantially as set forth.

9. The combination, with the feed-table and the receiving-roller of the delivery-tapes, of front guides arranged adjacent to said receiving-roller and a laterally-moving side-registering device arranged between the feed-table and said receiving-roller, whereby the sheet is first front-registered and the sheet is next drawn laterally and side-registered while the greater portion of the sheet is still resting on the pile, substantially as set forth.

10. The combination, with the stationary frame, the feed-table, the transversely-adjustable frame, and the buckling mechanism mounted thereon, of a side-registering device mounted on the frame of the buckling mechanism and adjustable therewith, substantially as set forth.

11. The combination, with the sheet-feeding device, whereby the sheets are fed successively, of a side-registering device provided with a rock-arm which oscillates transversely with reference to the direction in which the sheets are fed, a fixed jaw and a movable jaw mounted on said rock-arm, an actuating device which oscillates the rock-arm, and a rotating cam which controls the position of the movable jaw in the different positions of the rock-arm, substantially as set forth.

Witness my hand this 3d day of June, 1891.

FREDERICK HART.

Witnesses:

THEO. L. POPP,
JENNIE CLOUGH.