(No Model.)

2 Sheets—Sheet 1.

# F. HART.

## APPARATUS FOR DELIVERING SHEET PAPER.

No. 415,267. Patented Nov. 19, 1889.

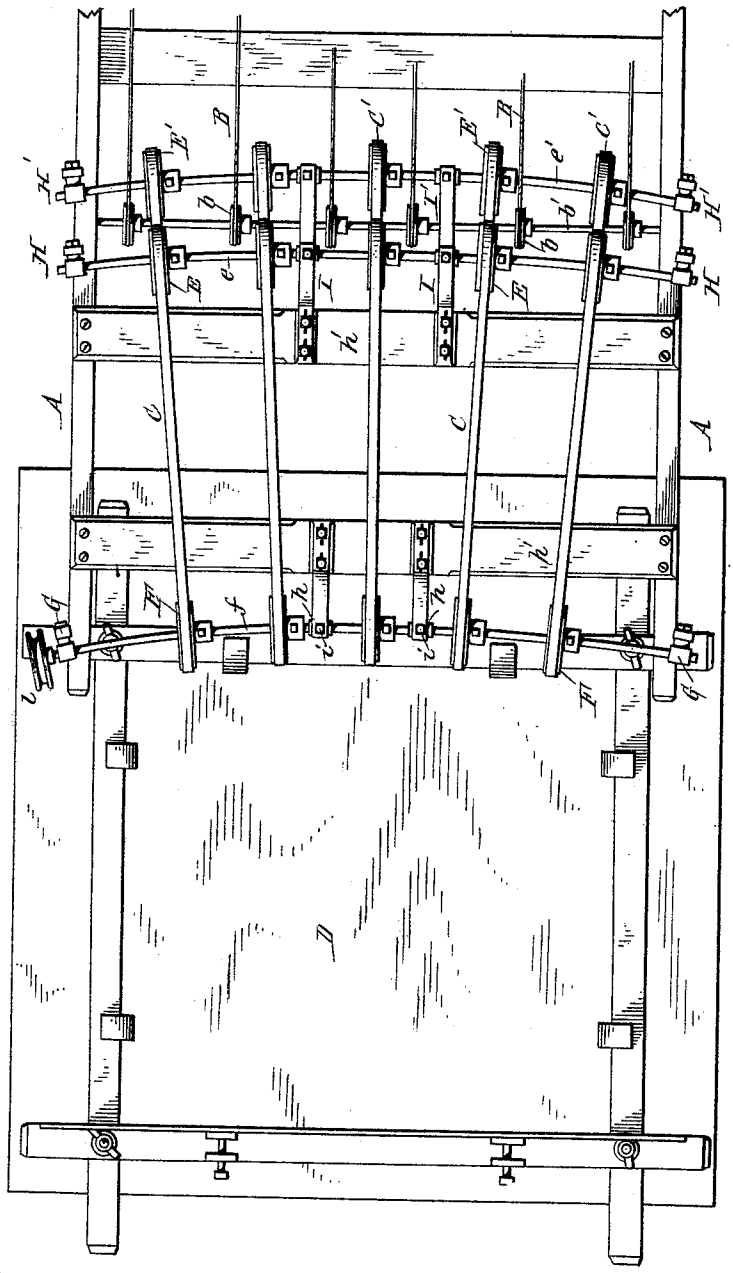

Fig. 1.

Witnesses:
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C. F. Geyer

Frederick Hart, Inventor.
By Edward Wilhelm
Attorney.

(No Model.) 2 Sheets—Sheet 2.

# F. HART.

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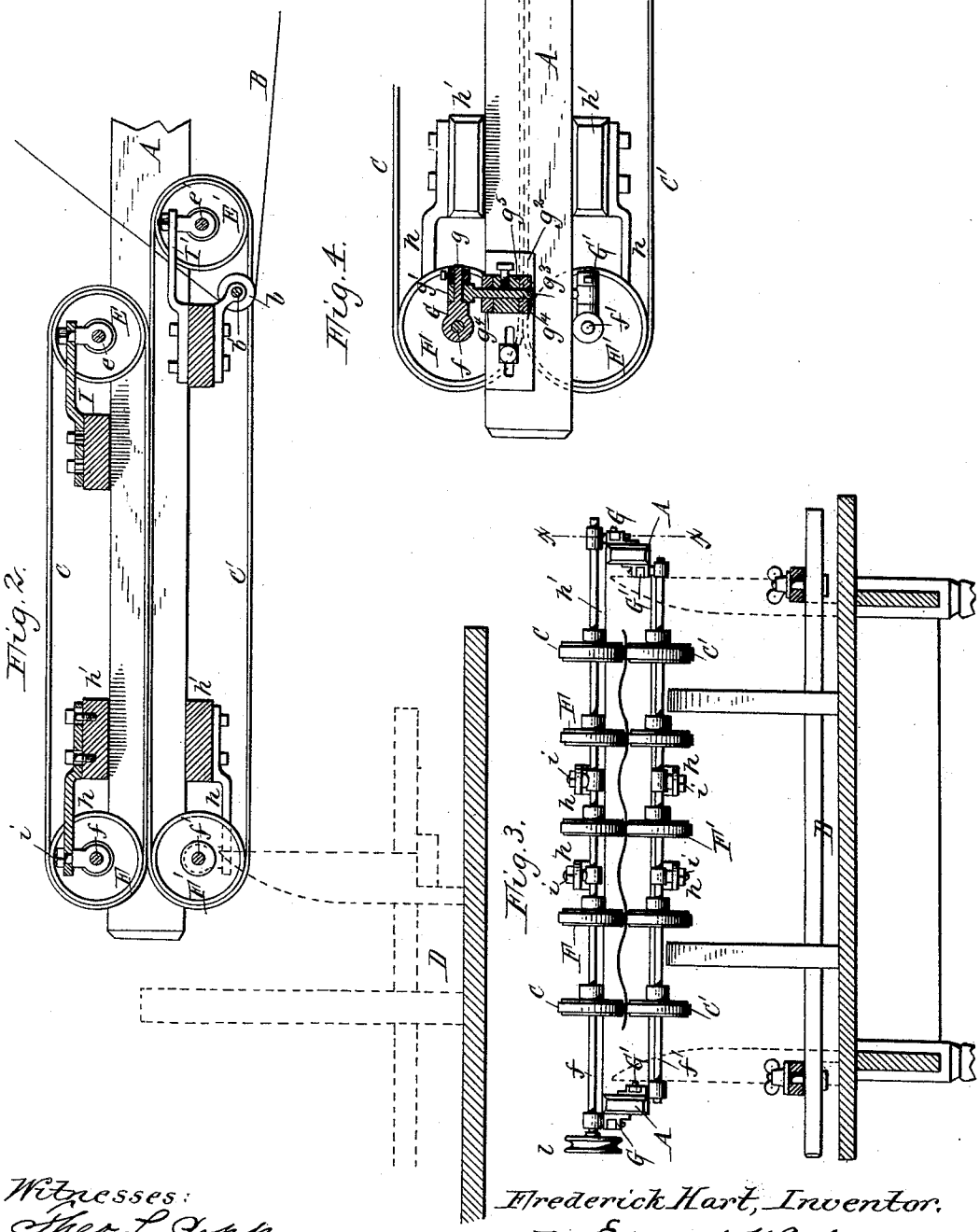

Fig. 2.



Fig. 4.



Fig. 3.

Witnesses:
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Frederick Hart, Inventor.
By Edward Wilhelm
Attorney.

# UNITED STATES PATENT OFFICE.

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

## APPARATUS FOR DELIVERING SHEET PAPER.

SPECIFICATION forming part of Letters Patent No. 415,267, dated November 19, 1889.

Application filed June 17, 1889. Serial No. 314,639. (No model.)

*To all whom it may concern:*

Be it known that I, FREDERICK HART, a subject of the Queen of England, residing at Poughkeepsie, in the county of Dutchess and State of New York, United States of America, have invented a new and useful Improvement in Apparatus for Delivering Sheet Paper, of which the following is a specification.

This invention relates to the delivery apparatus which is employed in connection with printing-presses and ruling and other machines for delivering the sheets upon a pile in a box or receptacle arranged at the discharge end of the machine.

In delivering sheets of paper to a receptacle or box they are liable to be broken or doubled up, and their printed surface is liable to be blurred or marred by the front edge of the sheet descending and coming in contact with the top of the pile before the front edge of the sheet has reached the farther end of the pile. This is caused by the sheet of paper not being stiff enough to sustain its own weight and by the resistance of the air, which retards the advance of the front portion of the sheet, while its rear portion is still propelled forward by the delivery mechanism.

The object of my invention is to provide means for corrugating the sheets preparatory to their delivery into the receptacle or box, whereby they are stiffened and enabled to support themselves, so that each sheet issues from the delivery mechanism in a horizontal position, or nearly so, and retains this position until it arrives over the pile, when its further progress is arrested and it is allowed to settle evenly in place on the pile. This enables large sheets and soft paper to be evenly and accurately piled without breaking or marring the paper.

The invention consists of the improvements which will be hereinafter fully set forth, and pointed out in the claims.

In the accompanying drawings, consisting of two sheets, Figure 1 is a top plan view of my improved sheet-delivery apparatus. Fig. 2 is a longitudinal section of the apparatus on an enlarged scale. Fig. 3 is a rear view of the same. Fig. 4 is a vertical section, on an enlarged scale, of one of the swiveling bearings of the curved shaft at the rear end of the apparatus, the section being taken in line $x\ x$, Fig. 3.

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

A A represent the side pieces of the horizontal supporting-frame of the delivery apparatus, which may be supported upon the frame of the printing-press or other machine.

B represents the feed-tapes, whereby the sheets of paper are carried from the cylinder of the printing-press to the delivery mechanism. These feed-tapes run around the press-cylinder and around tape-rollers $b$, mounted on a transverse shaft $b'$, journaled in the side pieces A of the supporting-frame, and are the same tapes which are ordinarily used with the fly.

C represents the upper delivery-tapes, and C′ the lower tapes, between which the sheets are fed by the tapes B, and by which the sheets are carried to the receptacle D. The front portions of the delivery-tapes C C′ run around tape-wheels E E′, mounted on transverse shafts $e\ e'$, arranged at the front of the delivery apparatus, and the rear portions of said tapes pass around tape-wheels F F′, mounted on transverse shafts $f\ f'$, arranged at the rear of the delivery apparatus. The rear tape-wheels are arranged more closely together on their shafts than the front tape-wheels, so that the delivery-tapes converge toward the rear end of the apparatus, as represented in Fig. 1. The shafts of the rear tape-wheels are sprung or curved toward the front of the apparatus, as clearly shown in Fig. 1, to permit the rear wheels of each series of tapes to be secured to the same shaft and place the wheels at the proper angles to prevent the tapes from running off the wheels. These shafts are mounted at their ends in swiveling bearings G G′, which accommodate themselves to the position of the shafts and permit the same to rotate freely without binding. Each of the bearings G of the upper shaft $f$ is provided with a horizontal stud or journal $g$, which is swiveled in a vertically-adjustable bearing $g'$, supported in a plate $g^2$, attached to the side pieces of the supporting-frame. The vertically-adjustable bearing is provided with a downwardly-projecting shank $g^3$, which is arranged in perforated lugs $g^4$,

formed on the supporting-plate $g^2$. The bearing is movably secured in these lugs by a clamping-collar $g^5$, secured to the shank of the bearing between these lugs. Upon loosening the set-screw of the clamping-collar the bearing can be adjusted vertically on the supporting-plate, and when properly adjusted the set-screw is again tightened. The supporting-plate is preferably made lengthwise-adjustable on the frame, so that the swiveling bearings may be shifted on the frame for tightening the delivery-tapes. This construction also enables the tape-wheels to be moved vertically to adjust the feed-tapes toward and from each other.

The bearings G of the upper shaft $f$ and their supporting-plates are arranged on the outer sides of the side pieces A of the main frame, while the bearings G′ of the lower shaft $f'$ and their supporting-plates are arranged on the inner sides of the side pieces. The parts of the lower bearings are constructed and arranged precisely like those of the upper bearings just described, except that the arrangement of the bearings with reference to their supporting-plates is reversed, the lower bearings being arranged below their supporting-plates and their shanks extending upwardly, while the upper bearings are arranged above their supporting-plates and their shanks extend downwardly.

The shafts $f f'$ are held in place in a sprung or curved position by intermediate bearings $h h$, embracing the inner portions of the shafts, and which are secured to cross-pieces $h' h'$, connecting the side bars of the supporting-frame. These bearings are made longitudinally adjustable on said cross-pieces by fastening-bolts passing through longitudinal slots in the brackets of the bearings, so that the latter can be adjusted to spring the shafts to the proper curve. These intermediate bearings are preferably swiveled upon their brackets by means of vertical bolts $i$, as represented in Figs. 2 and 3. The shafts $e e'$ of the front tape-rollers are preferably sprung concentric with the rear shafts $f f'$, so that all the tapes converge to the same point. This arrangement causes the tapes to run straight and prevents the same from moving laterally on the wheels. The shafts of the front tape-rollers are also mounted in swiveling end bearings H H′, and are held in a curved position by intermediate bearings I I′, similar in construction to the corresponding bearings of the rear shafts.

$l$ represents the driving-pulley, secured to one end of the upper rear shaft $f$.

The sheets of paper fed between the carrying-tapes are delivered by the latter toward the receiving-box D, the tapes being so arranged side by side as to seize the sheets in the blank spaces between the printed matter or pages, so as not to come in contact with the ink and blur the same. Each pair of carrying-tapes takes hold firmly of the sheet during the passage of the sheet through the delivery apparatus, and as the spaces between the converging tapes contract toward the rear end of the machine the portions of the sheets between the tapes are contracted and bulged, thereby corrugating the sheets in the direction in which they move. The corrugations render the sheets sufficiently stiff to cause them to retain a horizontal position, or nearly so, without buckling or turning over in the brief interval during which they are projected across the space above the receiving-box, thereby causing the sheets to descend horizontally, or nearly so, into the box upon the pile of paper and avoiding doubling of the sheets, blurring of the printed matter, and uneven piling. In settling into the box the sheets again become flattened and the sheets are aligned by the guides with which the box is provided. The delivery-tapes are driven at a sufficiently high speed to project the sheets with the necessary rapidity to bring them into the proper position, ready to descend, before they begin to collapse by the flattening of their corrugations.

In corrugating the paper it is essential that the sheet shall not be moved or slip laterally between the opposing faces or surfaces of each pair of carriers, as this will blur, smut, or offset the printed surface. In my machine the sheet is firmly seized by each pair of carriers, so that there is no lateral slip or movement of the sheet between the two carriers of each pair, whereby this difficulty is avoided.

I claim as my invention—

1. A sheet-delivery apparatus provided with carriers converging toward the delivery end of the apparatus, whereby the sheets are corrugated in being delivered, substantially as set forth.

2. The combination, with a sheet-receptacle, of converging carriers, whereby the sheets of paper are corrugated and delivered to the receptacle, substantially as set forth.

3. The combination of two sets of converging carriers arranged in pairs face to face, whereby the sheets are firmly seized on opposite sides and corrugated, substantially as set forth.

4. The combination, with the delivery-tapes, of guide-wheels around which said tapes run and curved or sprung shafts upon which said guide-wheels are mounted, substantially as set forth.

5. The combination, with the delivery-tapes, of guide-wheels around which said tapes run, curved or sprung shafts upon which said wheels are mounted, and swiveling bearings supporting said shafts, substantially as set forth.

6. The combination, with the endless converging tapes or carriers, of guide-wheels around which the rear portions of said carriers run, a curved or sprung shaft carrying said wheels and mounted at its ends in bearings, and an intermediate swiveling bearing in which the central portion of the shaft is

mounted, and whereby the shaft is held in its sprung position, substantially as set forth.

7. The combination, with the carrying-tapes and guide-wheels, of a sprung shaft carrying said wheels, and swiveling bearings carrying said shaft and made vertically adjustable, substantially as set forth.

8. The combination, with the carrying-tapes and their guide-wheels, of shafts carrying said wheels, swiveled bearings carrying said shafts, and each having an upright shank or stem, supporting-plates secured to the frame, made lengthwise adjustable thereon and provided with projecting lugs in which the shanks of said bearings are arranged, and clamping-collars secured to the shanks of the bearings between said lugs, substantially as set forth.

Witness my hand this 11th day of June, 1889.

FREDERICK HART.

Witnesses:
J. S. VAN CLEEF,
MARY CROUSE.