4 Sheets—Sheet 1.

C. KAHLER.

Newspaper-Folding Machine.

No. 216,332. Patented June 10, 1879.

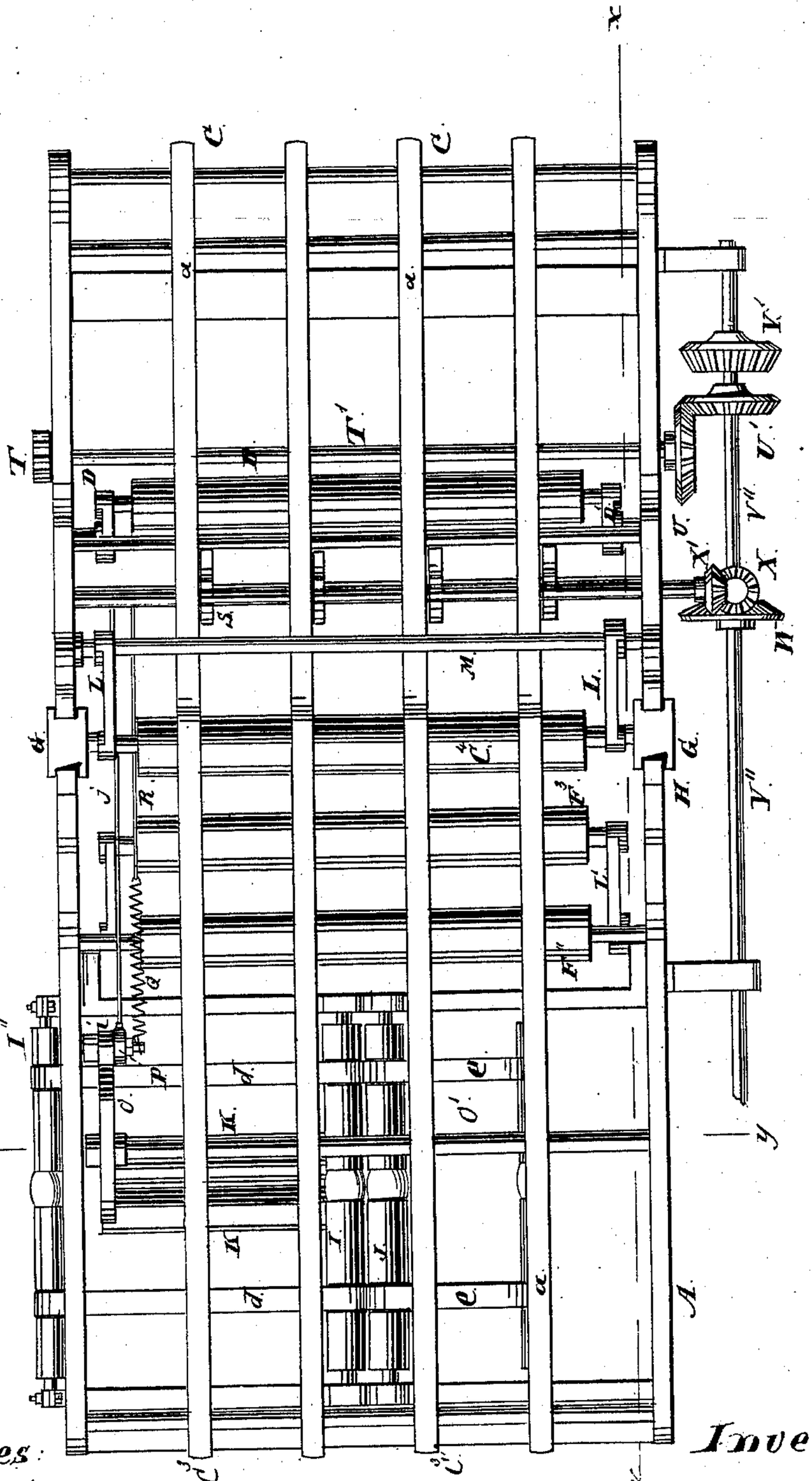

Fig. 1.

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H. L. Burns.

Inventor:

Conrad. Kahler

4 Sheets—Sheet 2.

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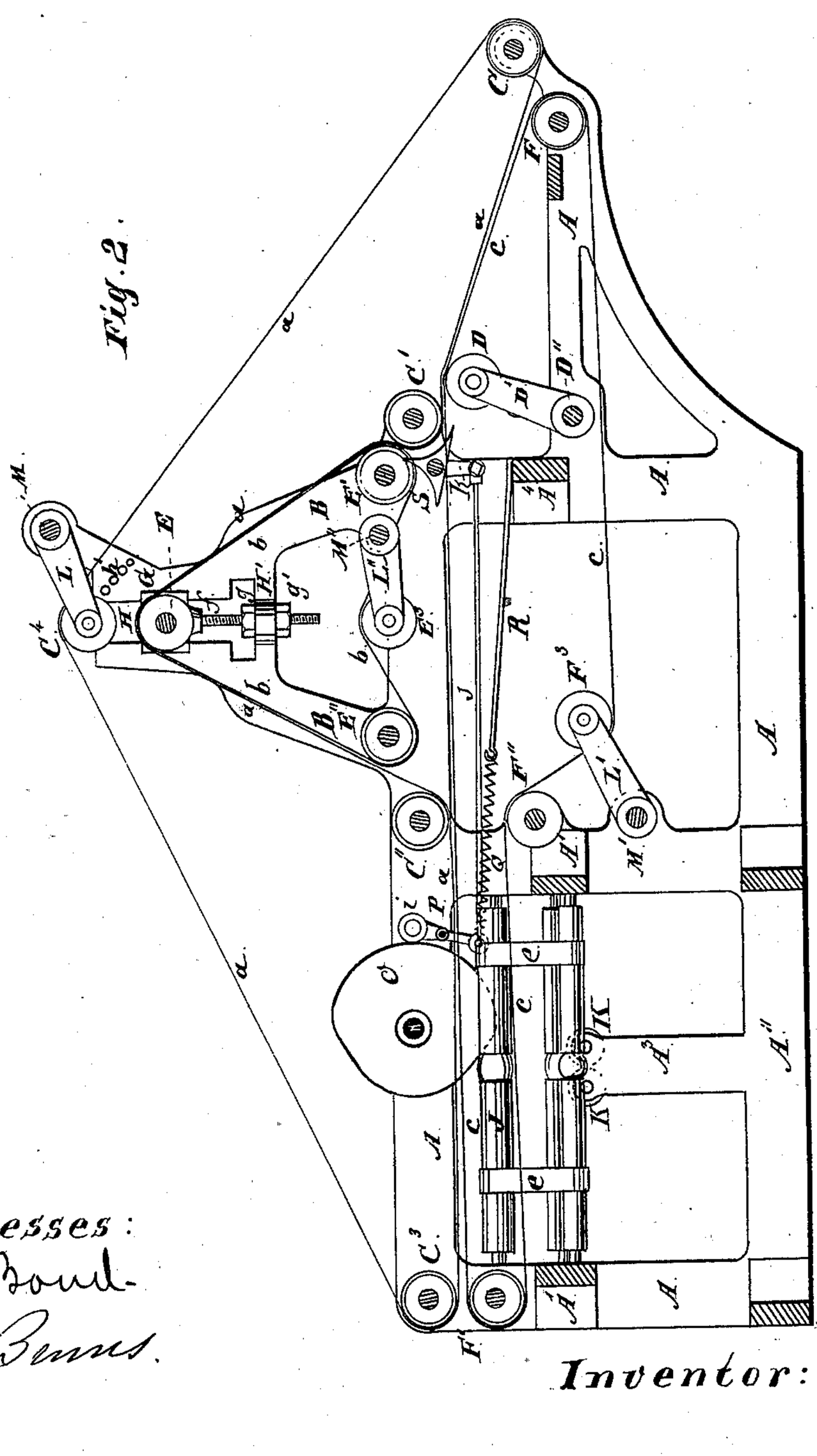
Newspaper-Folding Machine.

No. 216,332. Patented June 10, 1879.

Fig. 2.



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4 Sheets—Sheet 3.

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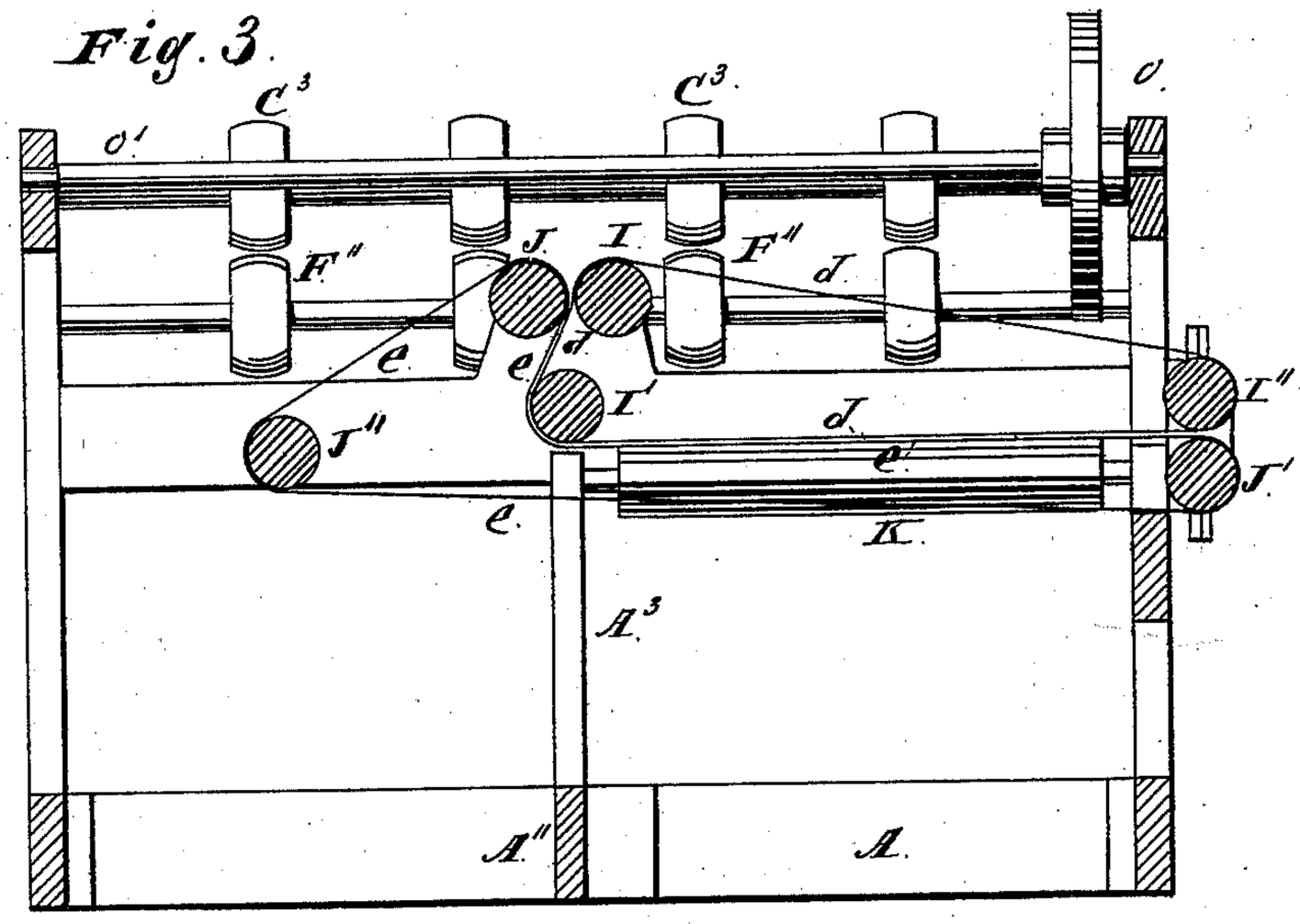
No. 216,332. Patented June 10, 1879.

Fig. 3.



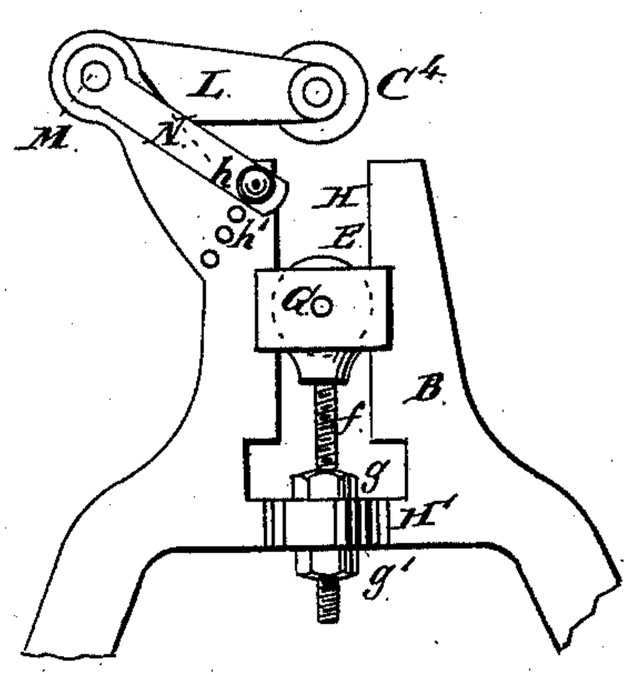


Fig. 4.

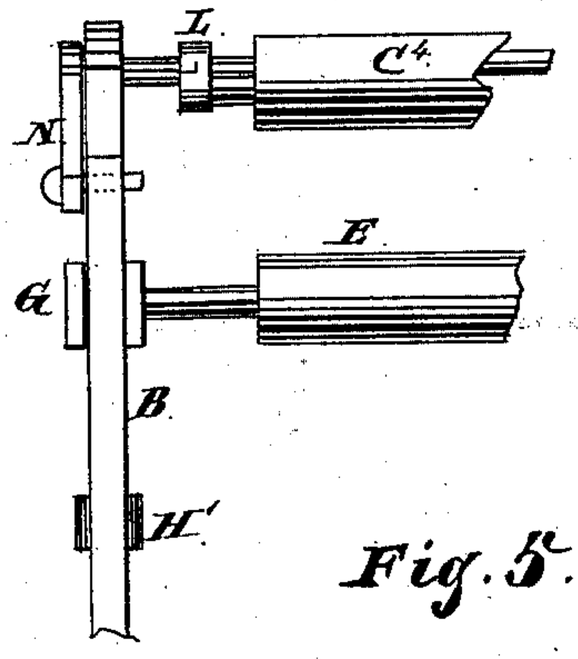


Fig. 5.

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4 Sheets—Sheet 4.

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Newspaper-Folding Machine.

No. 216,332. Patented June 10, 1879.

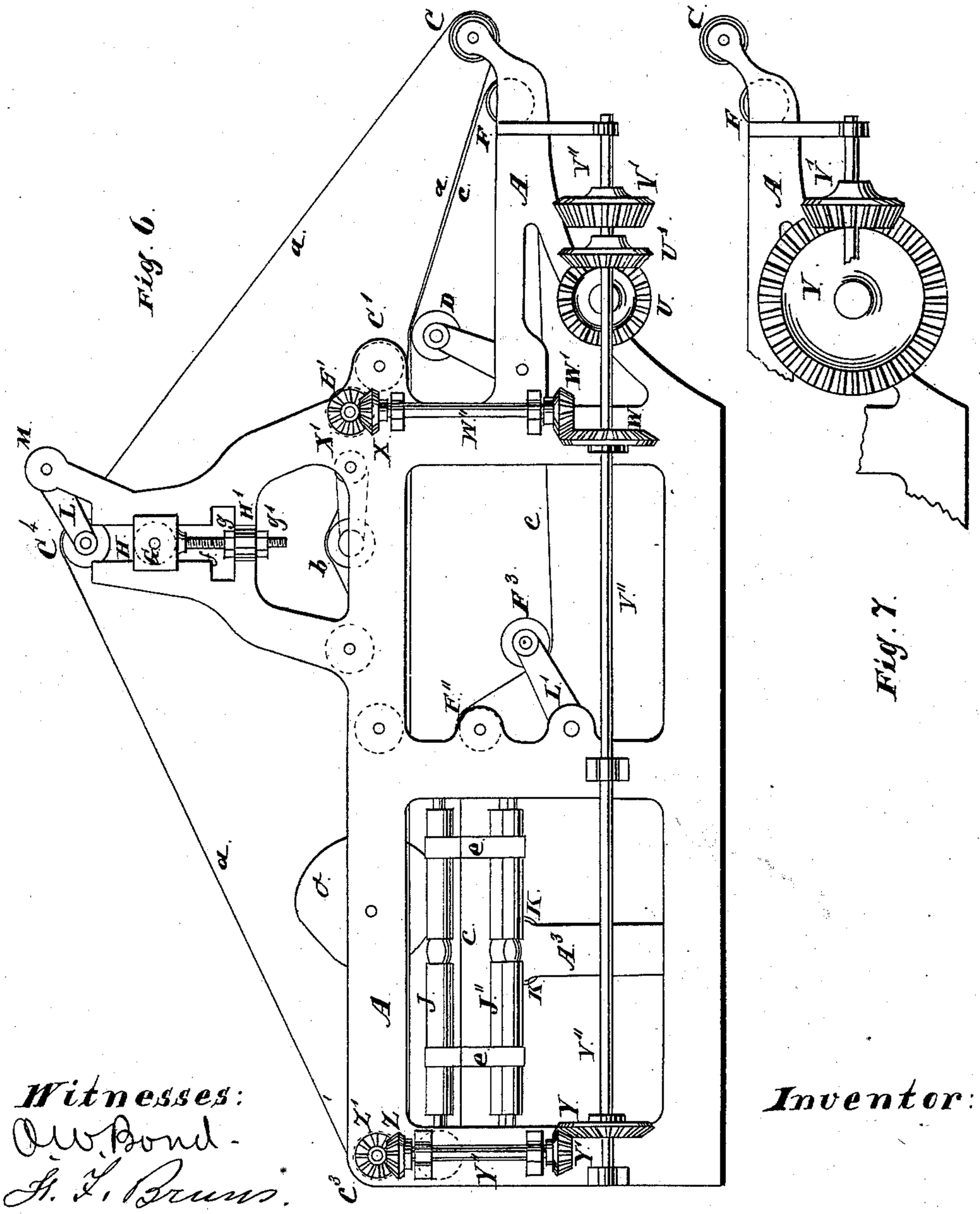

Fig. 6.

Fig. 7.

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Inventor:
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UNITED STATES PATENT OFFICE.

CONRAD KAHLER, OF CHICAGO, ILLINOIS, ASSIGNOR TO FRANK B. WILLIAMS, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN NEWSPAPER-FOLDING MACHINES.

Specification forming part of Letters Patent No. **216,332,** dated June 10, 1879; application filed November 5, 1878.

To all whom it may concern:

Be it known that I, CONRAD KAHLER, of the city of Chicago, Cook county, State of Illinois, have invented new and useful Improvements in Newspaper-Folding Machines, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is a top or plan view; Fig. 2, a longitudinal vertical section on line *x x* of Fig. 1; Fig. 3, a vertical cross-section on line *y y* of Fig. 1; Figs. 4 and 5, details of the devices for regulating the travel of the deflected or upper sheet; Fig. 6, a side elevation, showing the gearing for folding double sheets; Fig. 7, a detail, showing the gearing for folding single sheets.

This invention relates to newspaper folding and delivery machines, and has for its object the construction of a mechanism adapted to fold double or single sheets without changing the operative mechanism; and its nature consists in doubling the speed of the folding mechanism for folding single sheets, and in providing an adjustable roller or pulleys for the sheet elevating or deflecting tapes, whereby the amount of travel of the deflected or upper sheet can be regulated.

In the drawings, A represents the main frame; A′ A″ A^3 A^4, cross-pieces and an upright of the same; B, the frame for the devices operating the elevating-tapes; C C′ C″ C^3, the pulleys for the upper set of leading-tapes; C^4, the tape-tightener; D, the sheet-breaker; E, the adjustable roller or pulley; E′ E″, the pulleys for the interposed set of elevating-tapes; F F′ F″, the pulleys for the lower set of leading-tapes; E^3, the tape-tightener for the elevating-tapes; F^3, the tape-tightener for the lower set of leading-tapes; G, the adjustable bearings; H, the openings for the bearings; H′, the cross-bar; I J, the first folding-rollers; I′ I″ J′ J″, the pulleys for the tapes leading the sheets over the second folding-rollers; K K, the second folding-rollers; L L′ L″, the arms supporting the tape-tighteners; M M′ M″, the shafts supporting the tape-tightener arms; N, the lever or handle for raising and lowering the tape-tighteners; O, the cam disk or wheel for operating the switch; O′, the shaft for revolving the cam O; P, the pivoted lever or arm; Q, the spring for keeping the upper end of the arm P in contact with the cam-disk; R, the rod supporting one end of the coil-spring R; S, the switch; T, the driving-pinion; T′, the driving-shaft; U U′, the beveled wheels for driving the mechanism when folding double sheets; V V′, the beveled wheels for driving the mechanism when folding single sheets; V″, the main shaft; W W′ X X′ Y Y′ Z Z′, the beveled wheels for driving the tape pulleys or rollers; W″ Y″, the vertical shafts; *a*, the upper set of leading-tapes; *b*, the interposed set of elevating-tapes; *c*, the lower set of leading-tapes; *d e*, the tapes carrying the sheets to and over the rollers K; *f*, the screw-threaded rod; *g g′*, the nuts for adjusting the sliding bearings G; *h*, the pin for securing the lever N in position; *h′*, the adjusting-holes; *i*, the anti-friction roller for the arm P; *j*, the switch-rod; *k*, the switch arm or lever.

A printing-press is not shown; but the mechanism is primarily designed to be used with any of the well-known form of presses which print from a roll, commonly called "web-printing presses."

The frame-work A B may be of any form of construction suitable to receive and support the tape-operating devices and allow of the passage of the sheets without obstruction. The frame B may be made a part of the frame A, or be made separate and secured thereto in any suitable manner.

The mechanism is to be so located with reference to the printing-press as that the sheets will be taken directly from the cutting-cylinders by the tapes *a c*. The tapes *a* pass from the pulleys C, over the sheet-breaker D, under the pulleys C′, up over the roller E, down under the pulleys C″, under and around the pulleys C^3, over the tightener C^4, back to the pulleys C. The tapes *c* pass from the pulleys F, over the sheet-breaker D, to and around the pulleys F′, over the pulleys F″, and under the tightener F^3, back to the pulleys F.

The tapes *b*, which, in conjunction with the elevated portion of the tapes *a*, elevate the deflected sheet, are carried and operated by the roller E and pulleys E′ E″, passing under

the pulleys E′ E″ and over the tape-tightener E^3.

The roller E, over which the elevating-tapes pass, has the bearings for its shaft in the blocks G, which blocks slide up and down in openings H, provided for them in the frame B. To the lower face of each of these blocks G is secured a screw-threaded rod, *f*, which passes through a suitable opening for it in the cross-bar H′; and on this rod, each side of the cross-bar H′, are nuts *g g′*, by means of which the blocks G can be adjusted up and down.

The bearings for the shafts of the pulleys C C′ C″ C^3, E′ E″, and F F′ F″ are stationary, and located in the side pieces of the frames A B.

The sheet-breaker D is supported in the outer ends of the arms D′, the inner ends of which are secured to the shaft D″, which shaft is to be provided with a lever or arm, or other device, by means of which the sheet-breaker can be raised or lowered to adjust it properly. This sheet-breaker is arranged to operate with the tapes *a c*, which have a faster travel than the cutting-cylinders, and break the sheets between the tapes *a c*, each sheet being separated from the next succeeding sheet before the rear end of that sheet leaves the cutting-cylinders. This breaking will occur as the forward end of the first sheet reaches the pulleys C′, so that by reason of the fast travel of the tapes, the separated sheet will be carried ahead a sufficient distance for the proper operation of the folding devices on the sheets.

In folding double sheets this distance must be sufficient to enable the switch to be shifted to direct the sheets so as to deflect them or give them a straight line of travel alternately; and in folding separate single sheets the distance between each single sheet must be sufficient to enable the folding-blade to act upon the sheet and carry it out of the way before the next sheet is brought into position to be acted upon, all the single sheets being given the same line of travel, which can be easily done by having the switch remain stationary, so as to guide them to the same set of tapes.

In folding double sheets, the switch is automatically operated to guide the sheets to their proper set of tapes by the cam O on the shaft O′ through the arm or lever P, pivoted at or near its center to the frame, the upper end of which is provided with an anti-friction roller, *i*, which comes in contact with the edge of the cam-disk O, and its lower end is provided with a pin, to which is secured one end of the rod *j*, the other end of which is connected with the switch arm or lever *k*, as shown in Fig. 2.

The upper end of the pivoted arm P is held in contact with the cam by the spring Q, which is secured at one end to the lower end of the arm, and may be secured at the other end to the frame-work or to a rod, R, attached to the cross-piece A^4, as shown.

The sheets are taken directly from the cutting-cylinders by the tapes *a c*, separated, and one sheet carried ahead of the other and deflected by the switch and elevating-tapes, as described, and again brought together, one on top of the other, as they pass under the pulleys C″, and carried to and overlaid on the folding-rollers I J between the leading-tapes *a c*.

The folding-rollers I J are located just beneath the tapes, and so as to bring the opening or passage between them, directly under the center of the sheets, and are supported in suitable bearings in the pieces A′.

The tapes *d e* lead from these rollers over the second set of folding-rollers, K, which are arranged to fold the sheets transversely to the preceding fold, and are supported in suitable bearings in the upright A^3 and side piece of the frame. The tapes *d* pass from the roller I down to and under the roller I′, thence to, under, and around the roller I″, back to the roller I; and the tapes *e* pass from the roller J down to and under the roller I′, thence to and around the roller J′, thence back to, under, and around the roller J″ to the roller J, as shown in Fig. 3.

After the sheet has been folded at the rollers I J by a suitable blade, they are taken by the tapes *d e* and carried over the rollers K, where they are acted upon by a folding-blade and the next fold given to them.

The tightener C^4 is supported in the outer ends of the arms L, the inner ends of which are secured to the shaft M, the end of which projects beyond the frame, and is provided with an arm or lever, N, in the outer end of which is an opening to receive a pin, *h*, which pin can be passed into any one of the series of holes *h′* and lock the lever in any desired position. By means of this lever N the tightener can be adjusted to any desired position to hold the tapes taut.

The tighteners E^3 and F^3 are supported in arms L′ L″ on shafts M′ M″, which shafts may be provided with arms or levers similar to N, for adjusting and holding the tighteners in any desired position.

The pinion T is secured to one end of the shaft T′, which has its bearings in the side pieces of the frame, and is arranged to gear with a suitable wheel on the press. To the other end of this shaft T′, as shown in Figs. 1 and 6, is secured a bevel or gear wheel, U, which meshes with a similar wheel, U′, on the shaft V″, which shaft revolves in suitable bearings secured to the frame, and extends the length of the frame, as shown in Fig. 6. On this shaft V″ are bevel or gear wheels W and Y. The wheel W meshes with the wheel W′, secured to one end of the shaft W″, to the other end of which is secured the wheel X, which meshes with the wheel X′ on the end of the shaft of the pulleys E′. The wheel Y meshes with the wheel Y′, secured to one end of the shaft Y″, to the other end of which is secured the wheel Z, which meshes with the wheel Z′ on the end of the shaft of the pulleys C^3.

The arrangement of gear just described is

used for folding double sheets. To fold separate single sheets a faster speed must be given to the mechanism, one way of doing which is by removing the wheel U and replacing it by the wheel V, (shown in Fig. 7,) having a larger diameter than the wheel U, which wheel is made to mesh with the wheel V′, thereby revolving the shaft V″ and the parts operated therefrom at double the rate of speed.

The pinion T must be of a less diameter than the wheel on the press with which it is engaged, so as to increase the speed of the folding mechanism sufficiently to enable the tapes to remove the sheets, as before described, after they are separated.

In the operation of folding double sheets, if the travel of the upper or deflected sheet is such as to bring its forward edge ahead of the forward edge of the under sheet at the pulleys C″, the roller is raised, and the tightener E‴ lowered to keep the tapes taut until the proper amount of travel is given to the sheet to bring the edges and centers in line; and if the travel of the upper or deflected sheet is such as to bring its forward edge back of the forward edge of the under sheet at the pulleys C″, the roller E is lowered, and the tightener E‴ adjusted accordingly, until the travel of the sheet is such as to bring the edges and centers in line.

By means of this adjustable roller the travel of the sheets can be easily changed so as to insure their proper delivery to the folding-rollers.

The adjustable roller for the elevating-tapes need not necessarily be the upper one, as the roller or pulley E″ might be made adjustable with a like result; and other devices than the screw-threaded rod *f* and set-nuts *g g′* can be used for raising and lowering the block or bearing G.

In folding single sheets the rate of speed of the folding mechanism is doubled, either by the wheel V or in some other suitable manner, so as to increase the distance between the single sheets sufficiently to enable each single sheet to be folded by the rollers I J and the folding-blade, and removed by the tapes *d e* before the next single sheet is brought into position to be acted upon in a like manner.

In folding single sheets the switch S is to be disconnected from its operating mechanism, and set so as to give all the single sheets the same line of travel, which is preferably the straight line.

By this arrangement a sheet delivery and folding apparatus is provided on which double sheets and separate single sheets can be folded without changing any of the parts, except to give them an increased speed for folding the single sheets; and by the use of leading-tapes *d e*, for delivering the sheets between them to the next folding devices, a better delivery of the sheets is provided, and one which greatly increases the folding capacity, and is better adapted for the disposal of the sheets in a uniform manner by delivering them properly for the action of the folding-blade.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a printing-machine delivery and folding apparatus, the combination of tapes leading directly from cutting-cylinders onto and over the folding-rollers with a sheet separating and deflecting mechanism arranged to overlay single sheets for folding them together, and a driving mechanism for increasing the speed of the tapes and folding devices to fold single sheets separately by producing a space between such single sheets equal to their length, whereby single sheets can be taken from the printing-machine and be overlaid and folded or singly folded, all substantially as specified.

2. In a printing-press delivery and folding apparatus having an interposed sheet-deflecting mechanism, the combination of the roller or pulleys E and sliding bearings G with the screw-threaded rod *f*, bar H′, set-nuts *g g′*, tapes *b*, and a tape-tightener, substantially as and for the purposes specified.

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