No. 673,363. Patented Apr. 30, 1901.

W. K. HODGMAN.

PRINTING APPARATUS.

(Application filed Mar. 26, 1900.)

(No Model.) 4 Sheets—Sheet 1.

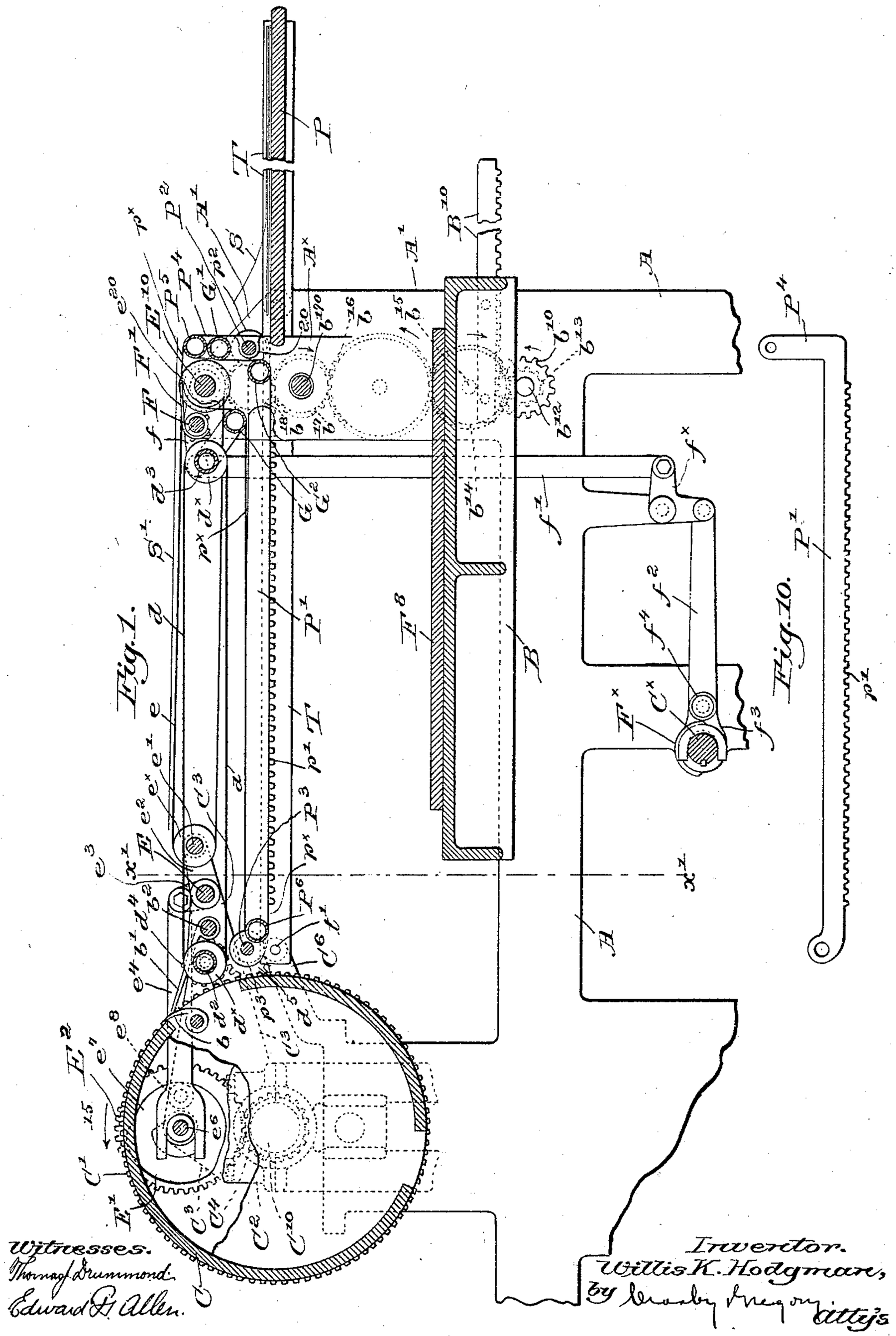

Fig. 1.

Fig. 10.

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(No Model.)

4 Sheets—Sheet 2.

Fig. 2.

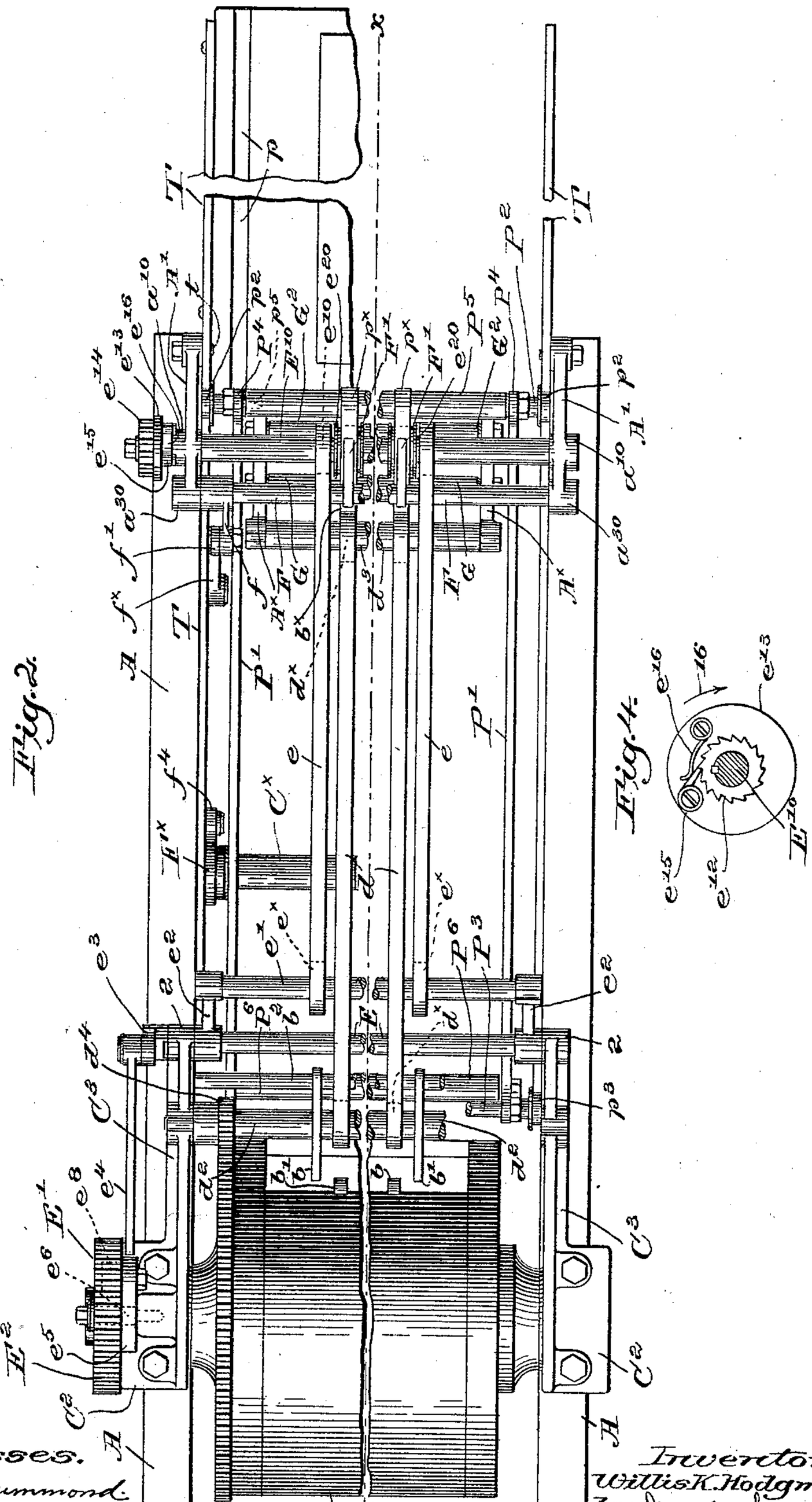

Fig. 4.

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(Application filed Mar. 26, 1900.)

(No Model.) 4 Sheets—Sheet 3.

Fig. 3.

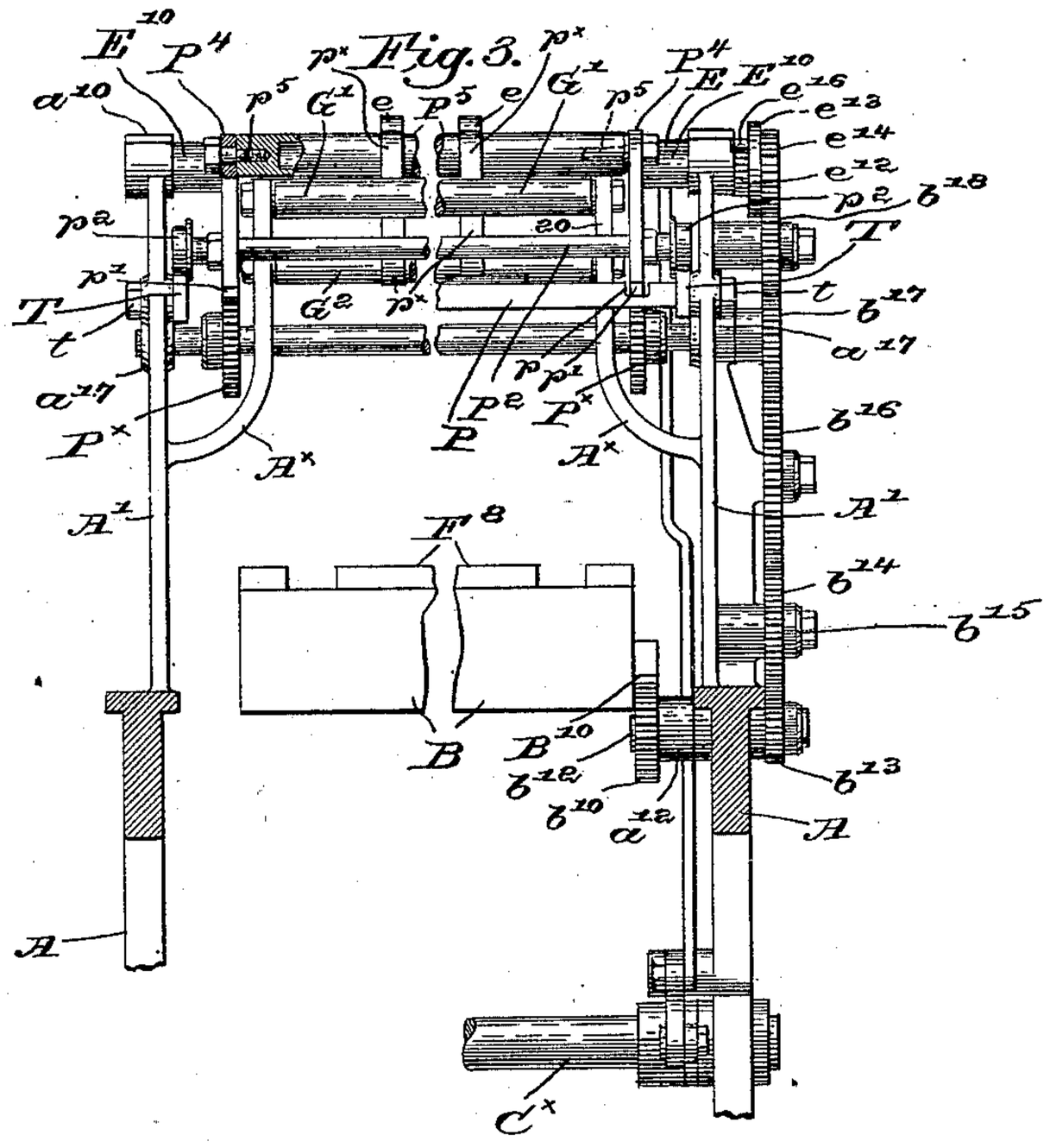


Fig. 5.

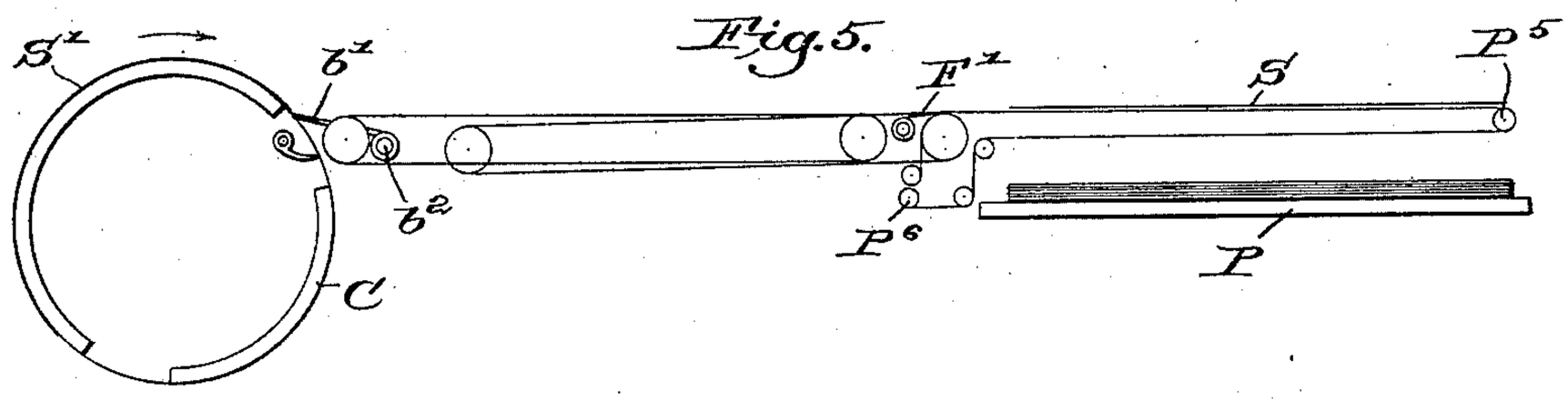
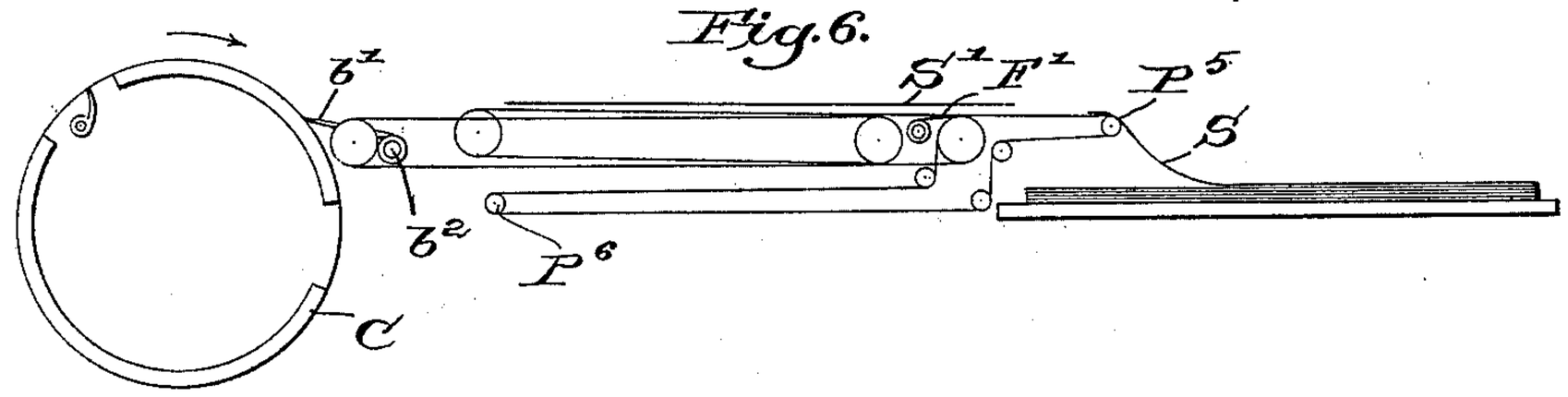


Fig. 6.



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PRINTING APPARATUS.

(Application filed Mar. 26, 1900.)

(No Model.) 4 Sheets—Sheet 4.

Fig. 7.

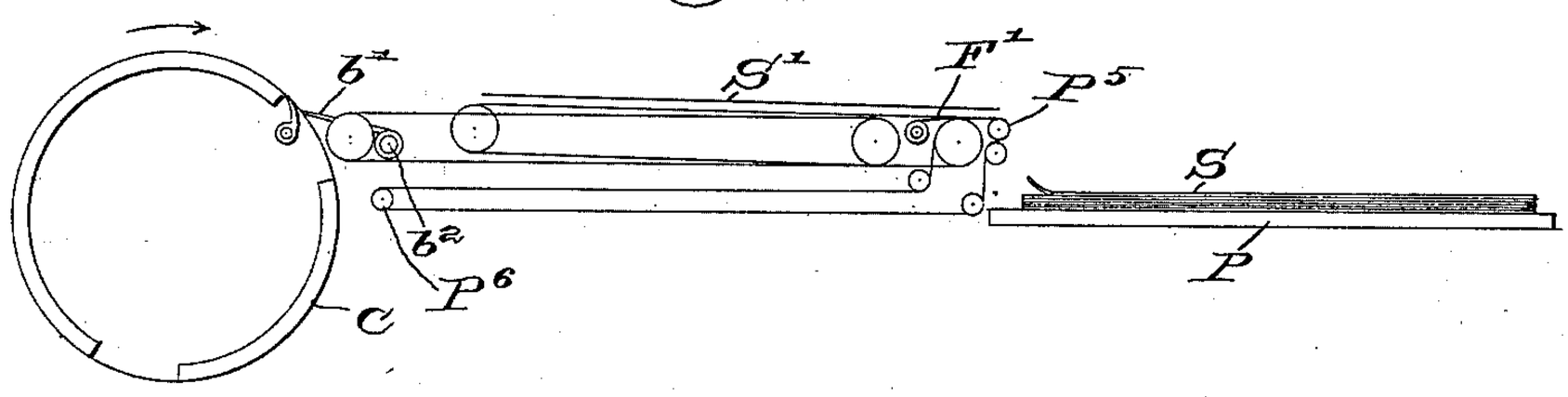


Fig. 8.

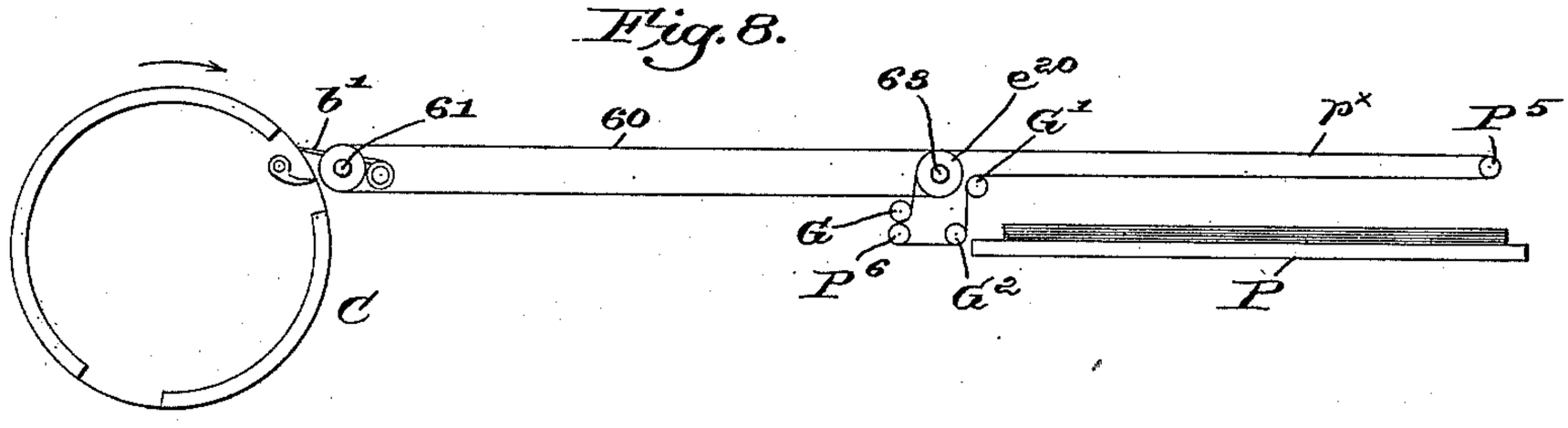
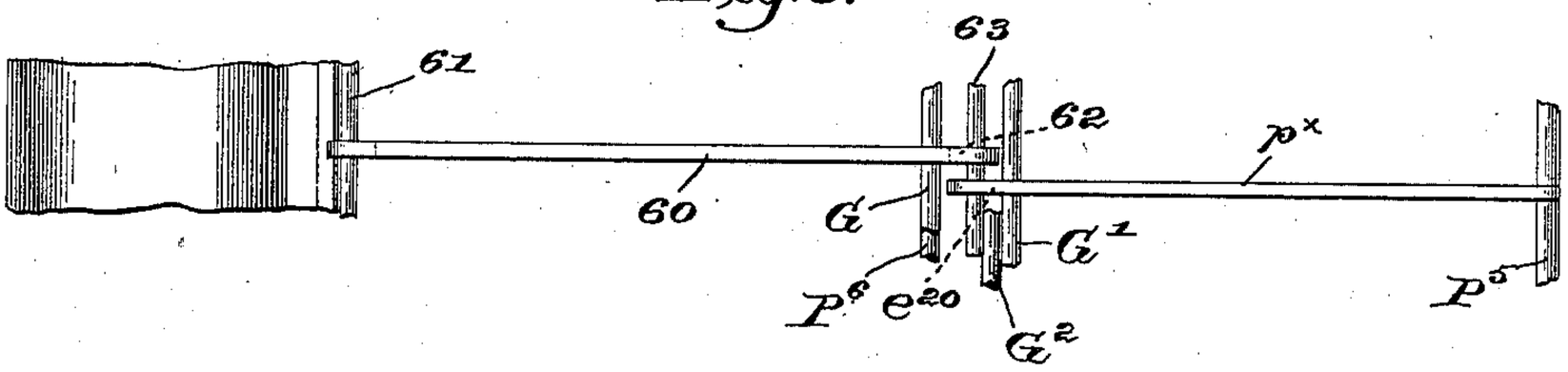


Fig. 9.



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UNITED STATES PATENT OFFICE.

WILLIS K. HODGMAN, OF TAUNTON, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO HUBER PRINTING PRESS COMPANY, OF SAME PLACE.

PRINTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 673,363, dated April 30, 1901.

Application filed March 26, 1900. Serial No. 10,188. (No model.)

To all whom it may concern:

Be it known that I, WILLIS K. HODGMAN, of Taunton, county of Bristol, State of Massachusetts, have invented an Improvement in Printing Apparatus, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to printing apparatus of that type wherein the paper to be printed is fed and delivered in sheet form; and it has for its object the production of novel, simple, and effective sheet delivery, carrying, and piling means for coöperating with a printing-press, whereby the printed sheets are taken from the impression-cylinder of the press and superposed or piled one upon another in an orderly manner with their printed faces uppermost.

I have chosen to herein illustrate my invention in connection with a particular type of printing-press for convenience of illustration and description; but it will be manifest hereinafter that my invention is adapted for use with any type of printing-press from which the printed sheets can be taken by a sheet-delivery mechanism substantially of the character herein shown.

Referring to the drawings, Figure 1 is a longitudinal sectional view of a portion of a printing-press with one embodiment of my invention applied thereto, the view being taken on the line *x x*, Fig. 2, viewed in the direction of the arrow X. Fig. 2 is a top or plan view of the apparatus shown in Fig. 1 centrally broken out and the two portions thereof brought together to save space. Fig. 3 is a right-hand elevation of the apparatus looking toward the left, the parts beyond the line *x' x'*, Fig. 1, being omitted to avoid confusion. Fig. 4 is a detail in side elevation of a clutch device forming a part of the means for controlling the speed of the sheet intermediate the sheet-delivery and sheet-piling mechanisms. Figs. 5, 6, and 7 are diagrammatic views, to be referred to, showing portions of the apparatus in different relative positions to more clearly illustrate the operation thereof. Figs. 8 and 9 are similar views of a modification, to be referred to; and Fig. 10 is a detail of one of the side bars of the sheet-piling carriage detached.

I have herein illustrated my invention in connection with a printing-press having a reciprocating bed and a continuously-rotated impression-cylinder which makes two revolutions for each impression, the cylinder being moved vertically to clear the bed during the second revolution—such, for instance, as shown and described in United States Patent No. 432,800, granted July 22, 1890, in which the bed is reciprocated by a crank and the cylinder is made to travel in unison with the bed during printing by suitable means. I have chosen such type of press having a crank motion, because I propose to use my invention therewith, and because the crank motion is particularly well adapted for effecting the bodily reciprocation of the sheet-piling mechanism, to be hereinafter described, the reciprocation being herein shown as derived by suitable means directly from the bed of the press. An independent crank motion could be employed, manifestly, to effect the bodily reciprocation of the sheet-piling mechanism, and the timing of such mechanism could then be so arranged that the sheet would not have to come to substantially a full stop after being stripped from the impression-cylinder, as herein provided for, the controlling mechanism in such instance reducing the speed of the sheet to conform to the speed of the sheet-piling mechanism. In the preferred embodiment of my invention the sheet is stripped from the impression-cylinder by usual stripper-fingers and carried forward a certain distance at substantially the surface speed of the cylinder by the usual tapes of the sheet-delivery mechanism located in front of and driven by or through the cylinder. The sheet-controlling means then reduces the speed of the sheet, retarding the same until the sheet-piling mechanism reaches the inner end of its stroke, whereupon motion is imparted to the tapes of the controlling means and the sheet is fed thereby to the sheet-piling tapes at substantially the speed of the latter.

In actual practice the stroke of the bed of the press herein referred to is about sixty-two inches and the stroke of the sheet-piling mechanism bodily is about thirty-six inches,

so that the speed of the latter is considerably slower than that of the bed. This is of very great practical advantage, because a sheet can be controlled and piled better at a slow speed than at a fast speed, and by the sheet-controlling means, to be described, which comprises a series of endless tapes, which are stationary during one stroke of the carriage of the sheet-piling mechanism and movable substantially in unison with the carriage during the other stroke, I am enabled to control and stop the sheet after it has been stripped from the cylinder and to finally deliver it to the sheet-piling mechanism at a speed conforming to the carriage thereof.

Referring now to the drawings, Figs. 1 and 2, the frame A, having suitable bearings for the operating parts, the vertically-movable impression-cylinder C, provided with a large gear C′, the reciprocating bed B, carrying the form F^8, the vertically-movable side rods C^2, in which the cylinder is journaled, and the cam-shaft $C^\times$ may be and are of usual and well-known construction in printing-presses of the type hereinbefore referred to. The impression-cylinder is provided with the usual sheet-gripping fingers *b*, Figs. 1 and 2, and the usual stripping-fingers *b′* are secured to a rocking rod or shaft b^2, mounted in front of the cylinder in suitable brackets or stands C^3 on the side rods C^2, the shaft b^2 being broken off at one end in Fig. 2 to show parts below it, and only two of the gripping and stripping fingers are shown in said Fig. 2.

Coöperating with the stripping-fingers I have shown the usual tapes *d* of the sheet-delivering means traveling over suitable sheaves $d^\times$ on shafts d^2 d^3, the former mounted in the brackets C^3 and driven by the cylinder through the gear C′ and pinions d^4 d^5, so that the tapes travel at substantially the surface speed of the cylinder in well-known manner. The shaft d^3 is journaled in branches $A^\times$, (best shown in Figs. 2 and 3,) secured to or forming part of upright portions A′ of the press-frame A.

The sheet-controlling means is herein shown as comprising a series of endless traveling tapes *e*, arranged to intermesh with the delivery-tapes *d*, the upper run of the controlling-tapes being at times below the plane of the upper run of the delivery-tapes and at other times raised above such plane to lift the sheet from such delivery-tapes and assume temporary control of the sheet, only two of the tapes *e* being shown in Fig. 2. It is to be understood, however, that there will be a sufficient number of delivery and controlling tapes to properly support and carry the sheets along after they are stripped from the cylinder.

At the end near the cylinder the tapes *e* pass around sheaves $e^\times$, fast on a shaft *e′*, journaled in arms e^2, fast on a rock-shaft E, mounted in bearings 2 of the brackets C^3, said rock-shaft having an arm e^3, pivotally connected to a link e^4. This link is rearwardly extended and bifurcated at e^5 to embrace a stud e^6, extended laterally from one of the brackets C^3, and on which stud is rotatably mounted a cam-disk E′, having a groove e^7 (see Fig. 1) on its inner side, in which travels a roller or other stud e^8 on the link e^4, the cam having a peripheral gear E^2 in mesh with and driven by a pinion C^4, secured to the impression-cylinder shaft C^{10}, the farther end of the cylinder being broken out in Fig. 1 to show in full lines a portion of the devices referred to. Manifestly rotation of the cam-disk in the direction of arrow 15, Fig. 1, will intermittingly raise the tapes *e* into operative position, Figs. 1, 6, and 7, and lower them into inoperative position between the tapes *d*, Fig. 5, for a purpose to be described.

At the outer ends the tapes or bands *e* pass over sheaves e^{10}, fast on a shaft E^{10}, rotatably mounted in bearings a^{10} on the top of the upright portions A′ of the main frame, said shaft projecting at one end beyond its bearing and having fast upon it a ratchet e^{12} (shown most clearly in Fig. 4) and an adjacent disk e^{13}, rotatably mounted on said shaft and provided with an attached pinion e^{14}. A pawl e^{15} on the inner face of the disk is held in engagement with the ratchet by a suitable spring e^{16}, (see Fig. 4,) so that when the disk is rotated in the direction of arrow 16, Fig. 4, the shaft E^{10} will also be rotated in the same direction, moving the upper run of the tapes *e* away from the cylinder to carry the sheet thereupon to the right, viewing Fig. 1.

The bed B has secured to it a long rack-bar B^{10}, broken out in Fig. 1 to engage a pinion b^{10}, fast on a short shaft b^{12}, mounted in a bearing a^{12} on the frame A, said shaft at its outer end having fast upon it a smaller pinion b^{13} in mesh with a gear b^{14}, rotatable on a stud b^{15} on the exterior of the frame. (See Fig. 3 and dotted lines, Fig. 1.) A train of gears b^{16} b^{17} b^{18} are suitably mounted on the frame intermediate the gear b^{14} and pinion e^{14} to rotate the latter first in one direction and then in the other by or through the reciprocation of the bed B, so that when the latter moves in or to the left, viewing Fig. 1, the disk e^{13} and shaft E^{10} will be rotated in the direction of arrow 16, Fig. 4. On the outward stroke of the bed the pawl e^{15} will click over the ratchet e^{12} and the shaft e^{10} will not be rotated, means being provided to prevent accidental rotation, as will be described.

A piling-table P is secured to the frame beyond the uprights A′ by means of rigid horizontally-extended bars or plates T, which are bolted to the uprights A′ at *t* and at their inner ends at *t′* to arms C^6, forming a part of the main frame of the press, said plates forming tracks for the carriage of the sheet-piling mechanism now to be described.

The carriage is herein shown as comprising parallel side bars P′, rigidly secured at their front and rear ends by cross-bars P^2 P^3, re-

spectively, the former when the carriage is at the inner end of its stroke, as shown in Fig. 1, entering recesses 20 in the upright branches $A^{\times}$. Suitable truck-wheels p^2 p^3 are mounted on the projecting ends of the cross-bars to travel on the tracks T, the carriage thus being capable of reciprocation on the latter with but little friction. The lower edges of the side bars P′ are provided with rack-teeth p', which mesh with actuating-gears $P^{\times}$, fast on a shaft b^{170}, to which the gear b^{17} is secured, said shaft passing loosely through the branches $A^{\times}$ and being supported in suitable bearings a^{17} on the uprights A′, (see Fig. 3,) the piling-table P having longitudinal grooves p therein to permit the free passage of the rack-teeth p' on the outward stroke of the carriage. At their outer ends the side bars P′ are upturned, as at P^4, to provide supports for stubs p^5, (see the left-hand side of Fig. 3,) on which is rotatably mounted a roll P^5, which I shall hereinafter term the "lead-roll," the top thereof being substantially tangent to the plane of the upper run of the delivery-tapes d. At or near the rear end of the carriage a like roll P^6 is similarly mounted, which I term the "follower-roll" of the sheet-piling mechanism, a series of endless tapes or bands $p^{\times}$ passing around said lead and follower rolls, but intermediate guide-rolls and a controlling device, to be described, fixedly mounted relative to the carriage, also support the piling-tapes $p^{\times}$. Guide-rolls G G′ G^2 are rotatably mounted in the branches $A^{\times}$, the former below and back of the shaft E^{10}, but high enough to permit the passage partly thereunder of the follower-roll when the carriage is fully out, (see Fig. 5,) while the roll G′ is in front of the shaft E^{10} and so located as to be below the lead-roll P^5 when the carriage is in, Figs. 1 and 7. The third guide-roll G^2 is located below the other two and having its axis substantially in the longitudinal plane of the axis of the follower-roll P^6, as herein shown, the tapes $p^{\times}$ passing around the lead-roll P^5, under it, and back over the guide-roll G′, thence down in front of and around roll G^2, and back around the follower-roll P^6. From the latter the tapes $p^{\times}$ lead forward around the guide-roll G and upward around preferably flanged sheaves e^{20}, fast on the shaft E^{10}, and thence to and around the lead-roll P^5, the path of the said tapes being clearly followed by reference to Fig. 1. Now inasmuch as the lead and follower rolls are movable bodily with the carriage and always are a fixed distance apart it follows that when the carriage moves out the follower-roll will give up, as it were, the tapes $p^{\times}$ as fast as the lead-roll draws them forward, said tapes at such time running over the sheaves e^{20} and guide-roll G′, and it will be understood that while I have only shown two of such sheaves—the outer ones—in Figs. 2 and 3 as many will be used as may be necessary to support the sheet properly.

A rock-shaft F is mounted in bearings a^{30} on the uprights A′ behind the shaft E^{10} and is provided with detent-fingers F′, which extend over the tapes $p^{\times}$ as they pass around the sheaves e^{20}, said rock-shaft having an attached arm f, pivotally connected to the upper end of a depending link f', which is jointed at its lower end to one arm of a bell-crank lever $f^{\times}$, (see Fig. 1,) fulcrumed on the frame A. The other arm of the bell-crank is jointed to a rod f^2, forked at its rear end at f^3 to embrace the cam-shaft $C^{\times}$, which has fast thereon a cam $F^{\times}$ to coöperate with a roller or other stud f^4 on the rod f^2, the cam when coöperating with the stud f^4 acting through the intermediate connections described to rock the shaft F and depress the detents F′ firmly on the tapes $p^{\times}$. Such action of the detents not only holds the tapes from movement over the sheaves e^{20}, but acts also to hold the shaft E^{10} from rotation, so that the controlling-tapes e, which, it will be remembered, are also driven from said shaft, will be held stationary.

Referring now to Fig. 5, the carriage is shown at the extreme outer end of its stroke, a sheet S, previously moved onto the sheet-piling tapes $p^{\times}$, being shown thereon, while a second sheet S′ is just about to be stripped from the cylinder by the stripping-fingers h' and transferred to the sheet-delivering tapes d, traveling at the surface speed of the cylinder. Now the detents F′ will be made operative by the action of the cam $F^{\times}$ just as the carriage begins its inward or return stroke, holding the tapes $p^{\times}$ stationary on the sheaves e^{20}, so that the upper run of the said tapes supporting the sheet S will be peeled, as it were, from beneath said sheet as the inward movement of the carriage moves the lead-roll P^5 from its extreme outward position, Fig. 5, toward its extreme inward position, Fig. 1, the outer end of the sheet dropping onto the table P, as shown in Fig. 6, wherein the peeling of the tapes from beneath the sheet is clearly illustrated. While the carriage has been moving inward the sheet S′ has been stripped from the cylinder and carried forward by the sheet-delivery tapes d into position to be taken by the sheet-piling mechanism; but when the sheet has been moved by said delivery-tapes into such position the carriage has not yet completed its inward stroke, so that the sheet-controlling means are now brought into action. Remembering that the detents F′ not only hold the tapes $p^{\times}$ stationary, but also hold the controlling-tapes e from travel at the same time, the action of the cam-disk E′ through the described intervening connections operates to raise the controlling-tapes e from their normal position, Fig. 5, into operative position above the tapes d, as in Fig. 6 or Fig. 1, in time to take the stripped sheet S′ from the delivery-tapes d and retard its speed, and in the construction shown the retardation amounts to bringing the stripped sheet to a full stop in the position shown in Figs. 1, 6, and 7. The sheet remains in this position until the carriage of the sheet-piling

mechanism has completed its inward stroke, Figs. 1 and 7, the leading edge of the sheet projecting over the tapes $p^{\times}$ between the sheaves e^{20} and lead-roll P^5 of the sheet-piling mechanism, the sheet S then having been placed on the table P or on top of the pile of sheets thereon. (See Fig. 7.) Now the rotation of the cam $F^{\times}$ operates to release the detents F′ and the pawl and ratchet e^{15}. e^{12} immediately begin the rotation of the shaft E^{10}, imparting forward movement to the upper run of the controlling-tapes *e* at substantially the speed of the upper run of the piling-tapes $p^{\times}$ as the latter are carried forward by the outward stroke of the carriage, so that the tapes *e* transfer the sheet S′ to the piling-tapes as the latter are carried along bodily with the carriage. As soon as the piling-tapes assume full control of the sheet the controlling-tapes are returned to normal inoperative position (shown in Fig. 5) before the next sheet is stripped from the cylinder, and the complete cycle of operation is completed. The interposition of the fixed guide-rolls G, G′, G^2, and sheaves e^{20}, between the lead and follower rolls of the sheet-piling mechanism, which move bodily in unison, divides the sheet-piling tapes $p^{\times}$ into two loops or bights, one of which increases in length as the other decreases, as will be evident from an inspection of Figs. 5, 6, and 7. Furthermore, when the carriage moves outward to carry the sheet out over the piling-table the tapes $p^{\times}$ move freely bodily therewith, there being no rotation of the lead and follower rolls; but on the inward stroke as the said tapes are held stationary by the detents F′ at the sheaves e^{20} it will be obvious that the piling-tapes will have a movement relative to the carriage, the rolls P^5 P^6 rotating on their axes to the right.

By holding the tapes on the inward stroke it is immaterial whether they are at all times held taut, for the holding corrects any trouble which might arise should the piling-tapes become slack from use.

In the apparatus herein described the printed sheet delivered from the press will be piled neatly and rapidly printed side up without the use of gripping or fly fingers and without any portions of the mechanism contacting with the printed side of the sheet. The means for controlling the sheet after it has been stripped from the impression-cylinder manifestly may be varied or modified without departing from the spirit and scope of my invention. For instance, the construction shown in Figs. 8 and 9 could be adopted and a set of tapes 60 to receive the sheet when stripped from the cylinder could readily be arranged to run at the surface speed of the cylinder to fully receive the sheet and then slowed down or stopped to retard the sheet until the sheet-piling carriage was in position to carry the sheet out over the table, the tapes being thereupon speeded up to the speed of the carriage on its outward stroke. The tapes 60 would be driven from the shaft 61 and carried around pulleys 62, loose on the shaft 63, which corresponds to the shaft E^{10}, hereinbefore referred to, the sheet-piling mechanism being substantially as hereinbefore described.

I have herein shown and described in detail one practical embodiment of my invention without attempting to show and describe the various modifications, changes, or variations of the several parts thereof which could be devised by those skilled in the art without departing from the spirit and scope of my invention.

Having fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In sheet delivery and piling apparatus, sheet-delivery mechanism, sheet-piling mechanism, and means mounted independently of the piling mechanism to control the speed of the sheet before it is transferred by the delivery to the piling mechanism.

2. In sheet delivery and piling apparatus, a continuously-rotating impression-cylinder, means to strip the sheets therefrom, sheet-piling mechanism, and means intermediate the stripping means and said piling mechanism and independent of the latter to control the speed of the sheet before it is transferred to the piling mechanism, and thereafter to effect such transfer at substantially the speed of said mechanism.

3. In printing apparatus, a continuously-rotating impression-cylinder, mechanism to strip and deliver the sheets therefrom, sheet-piling mechanism, and means mounted independently of said sheet-piling mechanism to control the speed of the sheet intermediate the delivery and piling mechanisms.

4. In printing apparatus, a continuously-rotating impression-cylinder, mechanism to strip and deliver the sheets therefrom, sheet-piling mechanism, including a reciprocating carriage, and means mounted independently of the carriage to reduce the speed of the sheet as it is brought into position to be transferred to the piling mechanism and to thereafter positively move the sheet forward upon said mechanism as the carriage moves outward.

5. In printing apparatus, a continuously-rotating impression-cylinder, mechanism to strip and deliver the sheets therefrom, sheet-piling mechanism, and means mounted independently of the sheet-piling mechanism to relieve the sheet from control by the delivery mechanism and to stop it, and thereafter to continue the forward movement of the sheet at the speed of the sheet-piling mechanism.

6. In sheet delivery and piling apparatus, sheet-delivery mechanism including a set of tapes traveling substantially at the surface speed of the impression-cylinder, and onto which the sheet passes, means, including a set of intermittingly-movable tapes, to retard the speed of the sheet before it is transferred to the sheet-piling mechanism, and sheet-piling mechanism including a recipro-

cating carriage and a set of supporting-tapes carried thereby, the tapes of the controlling means being moved at the outward speed of the carriage to transfer the sheet to the piling-tapes.

7. The combination with an impression-cylinder, and means to strip the sheets therefrom of a set of continuously-traveling tapes to take the stripped sheet, a second set of intermittingly-traveling controlling-tapes interposed between the first set, means to bodily raise said controlling-tapes and lift the sheet from the delivery-tapes and retard its speed, and to thereafter effect longitudinal travel of the controlling-tapes, and sheet-piling mechanism to receive the sheet from said controlling-tapes and outwardly-movable at substantially the speed thereof.

8. The combination with an impression-cylinder, and means to strip the sheets therefrom of a set of continuously-traveling tapes to take the stripped sheet, sheet-piling mechanism, including a reciprocating carriage, a set of tapes carried thereby and movable bodily on the outward stroke of the carriage, detent means to hold the piling-tapes at the inner end of the sheet on the return stroke of the carriage, to peel the tapes from the under side of the sheet, and means to assume control of and retard the speed of the sheet during its transfer from the delivery to the piling tapes.

9. In apparatus of the class described, two sets of tapes alternating with each other, the sheet passing from the impression-cylinder to one set of tapes, which are continuously driven, the other set of tapes being normally inoperative and quiescent, means to bodily move them into position to assume control of and reduce the speed of the sheet, and means to thereafter start said tapes and carry the sheet forward while they are in operative position.

10. In apparatus of the class described, the impression-cylinder, means to strip the sheet therefrom, two sets of endless tapes, one of which is continuously driven at the surface speed of the cylinder, to receive the stripped sheet, means to intermittingly drive the other set of tapes, means to raise bodily the upper runs thereof above the continuously-driven tapes, to lift the sheet therefrom, said intermittingly-driven tapes at such time being quiescent, to retard and stop the travel of the sheet, and sheet-piling mechanism to receive the sheet when said lifted tapes are thereafter driven.

11. The combination with a continuously-rotating impression-cylinder, and means to strip the sheets therefrom, of sheet-delivery mechanism and controlling means, comprising two sets of tapes, one set traveling intermittingly and normally below the other or delivery set, which latter travel continuously and take the stripped sheet, and means for moving bodily the first set into operative position to transfer the stripped sheet from the continuously-traveling tapes to the intermittingly-traveling tapes, whereby the speed of the sheet may be changed from the speed of the delivery-tapes.

12. In apparatus of the class described, two sets of traveling tapes, the members of the first set alternating with the members of the second or delivery set and lying normally below the plane of the upper runs of the latter, and means for elevating at a predetermined time the first set of tapes, to assume control of and change the speed of a sheet previously supported on the delivery set of tapes.

13. Printing mechanism, including a continuously-rotating impression-cylinder, sheet-piling mechanism operating at a slower speed than the printing mechanism, sheet stripping and delivery mechanism, to strip and deliver the sheets from the cylinder, and independent means for reducing the speed of the stripped sheet to conform to that of the piling mechanism.

14. Printing mechanism, including a continuously-rotating impression-cylinder, and a reciprocating bed, sheet-piling mechanism, including a carriage reciprocable at a slower speed than that of the bed, sheet-delivery mechanism to take the sheets from the cylinder at substantially the surface speed thereof, and controlling means, including a set of intermittingly-driven tapes, bodily movable when quiescent to assume control of and retard the stripped sheet on the inward stroke of the carriage, and driven at the speed of the latter on its outward stroke, to transfer the retarded sheet to the sheet-piling mechanism to be piled thereby.

15. In combination, a printing mechanism, a sheet-piling mechanism operative at a less speed than the printing mechanism, sheet-delivery mechanism, and means independent of said piling and delivery mechanisms to change the speed of the sheet from the normal speed of the delivery mechanism to that of the sheet-piling mechanism.

16. In combination, a printing mechanism, sheet-piling mechanism, sheet-delivery mechanism operated at a speed equal to that of the printing mechanism, and sheet-controlling means intermittingly driven at a speed equal to that of the sheet-piling mechanism, the sheet being transferred from the delivery mechanism to the controlling means, the latter changing the speed of the sheet to that of the sheet-piling mechanism.

17. Printing mechanism, including a continuously-rotating impression-cylinder and a reciprocating bed, sheet-delivery mechanism driven from the cylinder, sheet-piling mechanism and sheet-controlling means, operated by the bed and each comprising an intermittingly-driven set of tapes, and means to prevent travel of the said tapes while the piling mechanism is discharging a sheet, the tapes of the controlling means at such time changing the speed of the sheet between the delivery and piling mechanisms.

18. Printing mechanism, including a continuously-rotating impression-cylinder and a reciprocating bed, two sets of traveling tapes, one set being driven continuously by and at the surface speed of the cylinder, means to intermittingly raise the other set to take a sheet from the first set, sheet-piling mechanism, including a reciprocating carriage driven at a slower speed than the printing mechanism, a set of tapes bodily movable with said carriage, means to drive the raised set of tapes during the outward stroke of the carriage, to transfer the sheet to the piling-tapes, and means to effect movement of the said piling-tapes relatively to the carriage on the return stroke of the latter and also to stop the travel of the transferring-tapes at such time.

19. In apparatus of the class described, a set of continuously-driven sheet-delivery tapes, an intermeshing set of intermittingly-traveling tapes, a driving-shaft for the latter, sheet-piling mechanism, including a reciprocating carriage and a set of tapes carried thereby, passed around said driving-shaft, means to reciprocate the carriage and to rotate the shaft on the outward stroke of the carriage, whereby the intermittingly-driven tapes will be actuated to transfer a sheet to the sheet-piling mechanism, detents to prevent rotation of said shaft on the return stroke of the carriage, and means to elevate and lower the transferring-tapes, the elevation thereof taking a sheet from the delivery-tapes and reducing its speed prior to transfer to the sheet-piling mechanism.

20. A printing-press, including a continuously-rotating impression-cylinder, combined with sheet-delivery mechanism, means for removing the sheet from the cylinder and transferring it to said delivery mechanism, mechanism to pile the sheets one upon another, and separate means to remove the sheet from the control of the delivery mechanism, reduce its speed, and thereafter transfer it to the sheet-piling mechanism.

21. A sheet-piling mechanism for printing-presses, comprising a reciprocating carriage having lead and follower rolls mounted thereon, a set of endless tapes carried by said rolls, fixedly-positioned guide-rolls around which the tapes pass between said lead and follower rolls, dividing said tapes into two loops, and means to positively clamp the upper runs of the outer loops at their inner ends, to thereby hold the tapes stationary on the inward stroke of the carriage, whereby the upper runs of the outer loops are peeled from the under side of the sheet.

22. A sheet-piling mechanism for printing-presses, comprising a reciprocating carriage, a set of endless tapes mounted on the carriage and movable bodily therewith on its outward stroke, to carry the sheet to piling position, and means to clamp the several tapes at a single point, to thereby effect movement of said tapes relatively to the carriage on its return stroke, to peel said tapes from the under side of the sheet and discharge the latter.

23. A printing-press, including a front-delivery impression-cylinder, combined with means to take the printed sheet from the cylinder and transfer it to the piling mechanism, and sheet-piling mechanism, comprising a reciprocating carriage, a set of endless tapes mounted thereon, fixedly-positioned guide-rolls to divide them into two loops, said tapes moving bodily with the carriage on its outward stroke, whereby the lengthening outer loops carry the sheet to position to be piled, and means to positively clamp the several piling-tapes at a single point, to effect movement of the tapes relatively to the carriage on its return stroke, to gradually decrease the length of the outer loop and thereby peel the tapes from the sheet.

24. In apparatus of the class described, a set of sheet-delivery tapes, an intermittingly-operating set of controlling-tapes to take the sheet from the first set and reduce its speed, a driving-shaft for said controlling-tapes, and sheet-piling mechanism, including a set of tapes passed around said shaft and divided into two bights or loops, a reciprocating carriage to move said tapes bodily on its outward stroke to gradually increase the length of the outer loop and carry a sheet into position to be piled, and detents to stop the shaft and thereby the controlling and piling tapes as the carriage returns, the outer loops being thereby gradually reduced in length to peel the piling-tapes from the sheet and discharge the same.

25. The combination with a printing-press including a continuously-rotating, two-revolution impression-cylinder, of sheet-delivery mechanism, sheet-piling mechanism, and means mounted independently of said piling mechanism to control the speed of the sheet intermediate the said delivery and piling mechanisms and to move the sheet bodily in the direction of travel to transfer the sheet from the former to the latter.

26. In printing apparatus, an impression-cylinder, delivery mechanism to remove the sheet therefrom, a sheet-piling mechanism to take the printed sheet from the delivery mechanism, said sheet-piling mechanism comprising a reciprocating carriage and a set of endless tapes mounted thereon, and movable bodily therewith on its outward stroke, and means to clamp the several tapes adjacent the inner end of the travel of the carriage on the inward stroke of the latter.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIS K. HODGMAN.

Witnesses:

FREDK. M. ATWOOD,

SAML. L. HODGMAN.