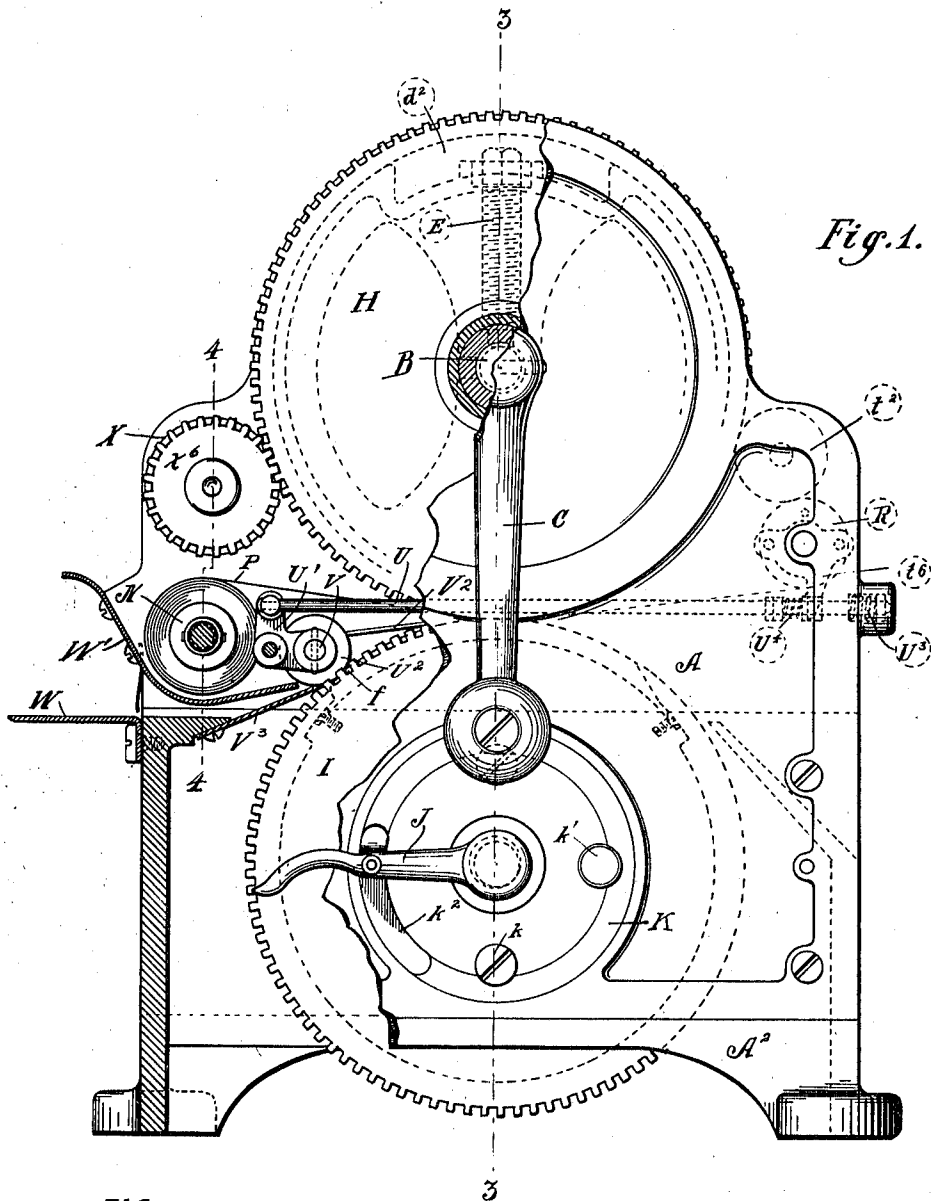


H. C. GAMMETER.
 DUPLICATING MACHINE.
 APPLICATION FILED MAR. 28, 1908.

1,004,408.

Patented Sept. 26, 1911.

4 SHEETS—SHEET 1



Witnesses:

Brennan & West.
 W. L. Mc Garrell.

Inventor:
 By Harry C. Gammeter.
 Bates, Ford & Hull,
 Attys.

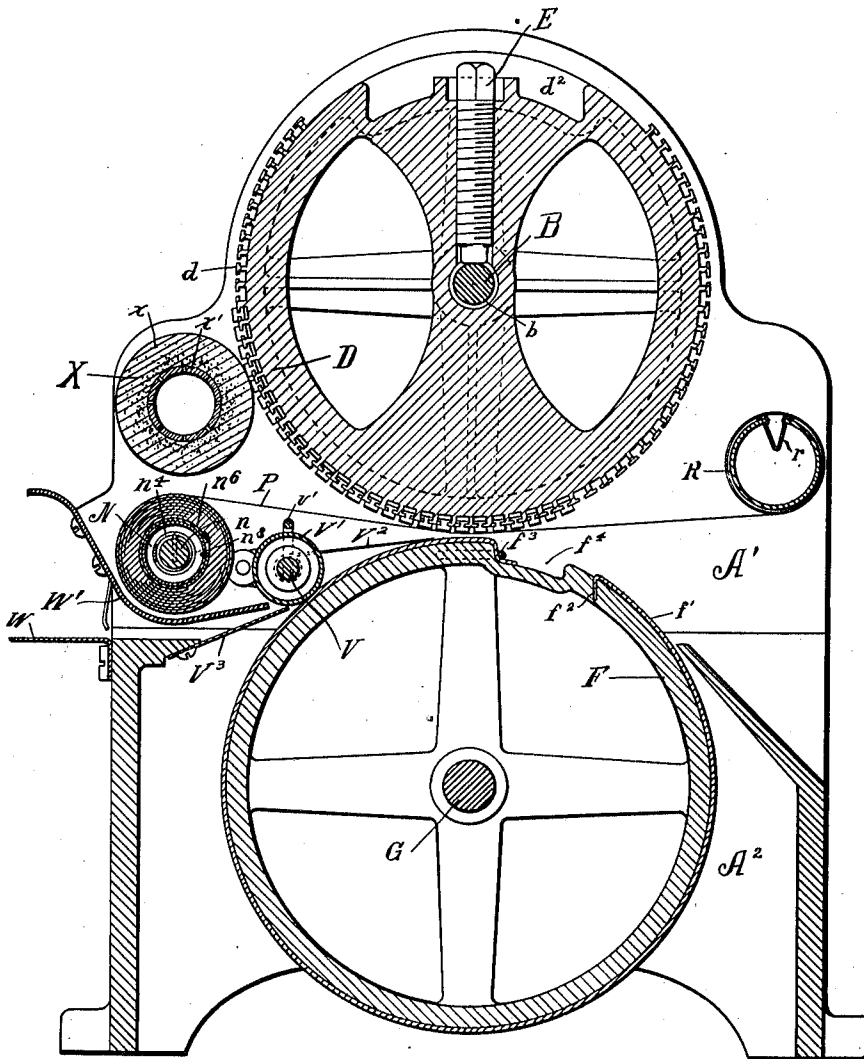
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4 SHEETS—SHEET 2.

Fig. 2.



Witnesses:

Brennan West
W. L. M^c Garrell.

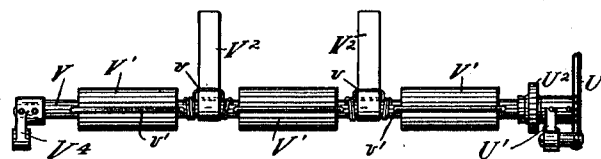
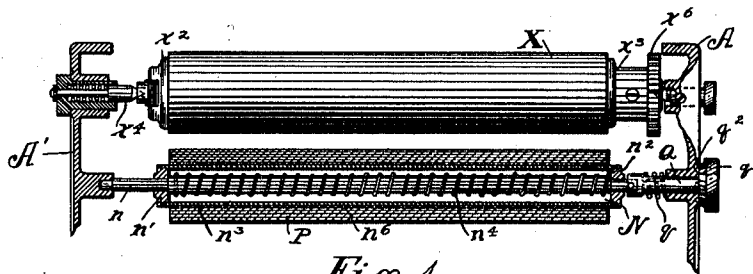
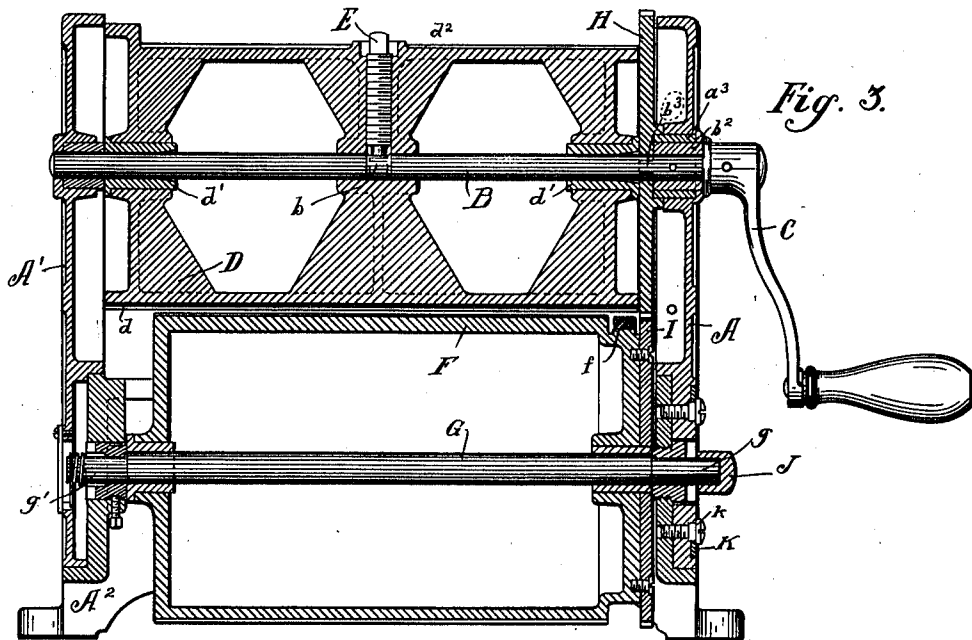
Inventor,
Harry C. Gammeter.
By Bates, Foul & Hull,
Attys.

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1,004,408.

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4 SHEETS—SHEET 3.



Witnesses:

Brennan & Co.
 W. L. M. Garrell.

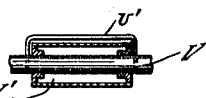


Fig. 6.

Inventor,
 Harry C. Gammeter.
 By Dale, Foul & Hull
 Attys.

H. C. GAMMETER.
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4 SHEETS—SHEET 4.

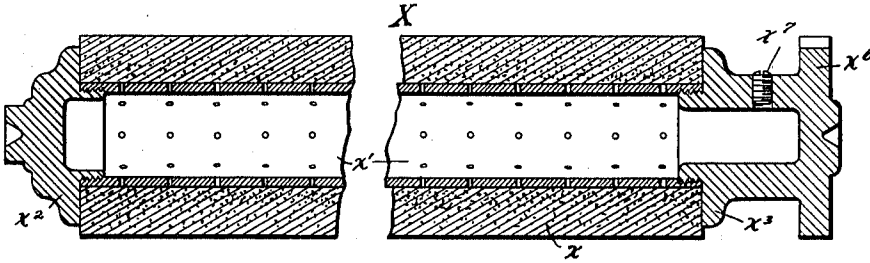


Fig. 7.

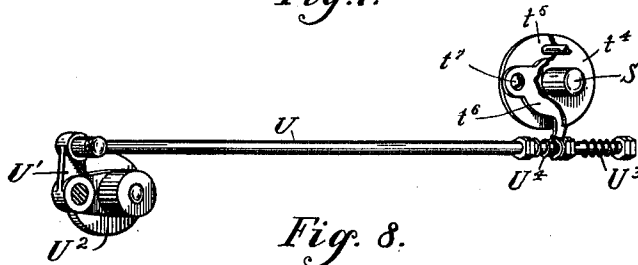


Fig. 8.

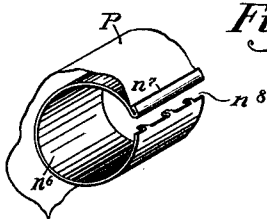


Fig. 10.

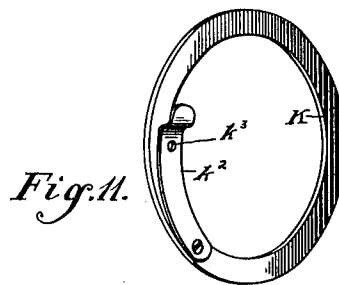


Fig. 11.

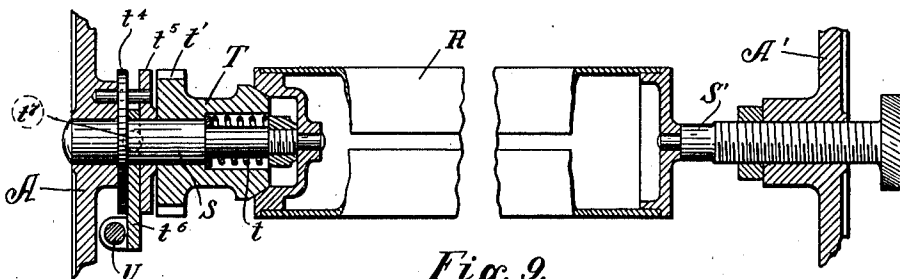


Fig. 9.

Witnesses:

Breman & West.
 W. L. Mc Garrell.

Inventor,
 Harry C. Gammeter.
 By Bates, Foulis & Hull
 Attys.

UNITED STATES PATENT OFFICE.

HARRY C. GAMMETER, OF CLEVELAND, OHIO, ASSIGNOR TO THE AMERICAN MULTI-GRAPH COMPANY, OF CLEVELAND, OHIO, A CORPORATION OF OHIO.

DUPLICATING-MACHINE.

1,004,408.

Specification of Letters Patent. Patented Sept. 26, 1911.

Application filed March 28, 1906. Serial No. 308,379.

To all whom it may concern:

Be it known that I, HARRY C. GAMMETER, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Duplicating-Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

This invention is designed to provide a simple and efficient printing device adapted for embodiment in a small office machine.

The machine prints with individual type mounted in longitudinal holders on one member of a couple which prints by rolling contact.

The invention is primarily concerned with an inking ribbon and mechanism for carrying and feeding it, enabling the ribbon to travel forwardly with the type during impressions and to be drawn backward between impressions.

The invention includes also the arrangement whereby the ribbon may be fastened on its spool and whereby the used portion of the ribbon may be removed and discarded. The paper feed operating conjointly with the ribbon feed and the means for preventing inopportune inking of the paper are also included within the present invention.

The invention may accordingly be most conveniently summarized as consisting of the combinations of cooperating elements hereinafter illustrated and set out in the claims.

In the drawings, Figure 1 is an end view, partly sectional, of my printing machine. Fig. 2 is a cross section thereof in a plane parallel with Fig. 1. Fig. 3 is a longitudinal vertical section along the axis of the printing drum and impression platen, as indicated by line 3—3 of Fig. 1. Fig. 4 is a detail showing the inking roller and the ribbon barrel, being a section substantially on the offset line 4—4 of Fig. 1. Fig. 5 is a detail showing, in plan, the paper feed rollers and adjacent parts. Fig. 6 is a section along the shaft shown in Fig. 5. Fig. 7 is a longitudinal section of the inking roller. Fig. 8 is a perspective detail of the clutch-operating mechanism of the ribbon feed. Fig. 9 is a sectional side elevation of the ribbon receiving roller and its clutch. Fig. 10 is a perspective view of the support and clamp upon which the ribbon is wound. Fig. 11 is a per-

spective view of the adjustable stop for the eccentric lever of the platen.

Referring by letters to the embodiment shown in the drawing, A and A' are a pair of rigid end plates mounted on a solid base A². The end plates occupy a recessed portion in the ends of the base and are firmly fastened to those ends by screws. This forms a very stiff and rigid frame.

B designates a shaft mounted in suitable bearings carried by the two end plates of the frame. On the end of this shaft is a crank C by which it may be rotated.

D indicates the printing drum which is a hollow webbed structure, as shown, having on its exterior parallel rails *d*, presenting type channels between them, the type having grooves in their opposite edges whereby they may be held in such channels. The drum carries bushings *d'* surrounding the shaft. Mounted radially in the drum is a set screw E, adapted to extend into a reduced portion *b* of the shaft B. The head of this set screw occupies a recess *d*² in the drum, whereby it does not project sufficiently to interfere with the type. When the set screw is loosened, the shaft B may be drawn out endwise, and the drum removed for the assemblage of type into its channels or the distribution of type already therein.

The printing drum, it will be seen, is adapted to carry a page form of assembled individual type, and by having this drum removable, the form may be removed intact and preserved for future use; or type may be assembled into, or distributed from, one drum while another is printing.

The feature of a removable holder for a page form of assembled type is claimed in my divisional application #574,660; filed July 30, 1910.

Cooperating with the printing drum is an impression drum F, mounted within the base on a shaft G. The drums D and F are geared together by the gears H and I respectively. The gear I is secured to the drum F, while the gear H is mounted on a frame-bushing *a*³ but is driven by lugs *b*³ on the bushing *b*² rigid with the shaft B.

The impression platen with its covering of removable soft material *f'* is of the same diameter as the printing drum with the type thereon. Thus in the successive rotations of the drums any type bears on the same por-

tion of the impression platen. This enables the impression platen to be overlaid or underlaid to provide for inequalities in the type. The soft covering f' is secured at one end in a slot f^2 in the drum, while the other end is held by a spring bale f^3 bending the covering into a recess f^4 in the drum.

The shaft G of the impression platen is shown as having eccentric extensions g g' mounted in bushings carried by the end members of the frame base. On the extension g is an arm J by which the shaft may be rotated to adjust the impression platen with reference to the printing drum. To lock this lever J in various adjusted positions, while allowing its convenient release, I provide the ring K which seats in an annular groove in the end frame member A. The heads of screws k confine this ring in the groove while allowing it movement therein, and a thumb screw k' furnishes means for clamping the ring in any desired position. Mounted on the ring is a detent spring k^2 with which the arm J is adapted to engage. A projection or pin on the inner side of this arm comes opposite an opening or depression k^3 in the spring, holding the arm in place. To release the arm, the spring is pressed toward the end plate of the machine.

In printing in imitation of typewritten work, it is desirable to make the impression through an inked ribbon. I have heretofore devised machines wherein the ribbon was mounted on spools set into the printing drum itself,—the ribbon passing around the drum. Such an arrangement while efficient, uses considerable space in the drum, requiring a larger drum to print a definite length of page than where the ribbon is carried independently of the drum. The present machine has been designed to make a very compact and simple structure, and I mount the ribbon outside of the drum, using a larger portion of the drum surface for type rails.

In the present machine, I provide a spring barrel N on which the ribbon P is mounted. This barrel consists of a central shaft n , heads n' and n^2 thereon, a tube n^3 connecting these heads, and a spring n^4 within the barrel, secured at one end to the shaft and at the other end to the head n^2 . The shaft is freely journaled in the frame at one end and at the other end extends into a socket carried by a short shaft Q. This shaft is pressed toward the drum by a spring q and its socket is so formed that it prevents the shaft having independent rotation. On the shaft Q is a head q' and on the frame and the face of the head which bears against it are formed coöperating projections and recesses q^2 , Fig. 4, holding the shaft Q against accidental displacement, while allowing adjustment of the spring by the turning of the head q' .

The ribbon P passes between the two drums, and at the rear thereof extends onto the receiving roll R, being held thereto by a suitable spring clip r . This receiving roll is automatically rotated as the drums are revolved, by mechanism hereinafter explained, and thus takes up the ribbon gripped and fed forward with the paper by the two drums, such operation winding the ribbon off of the ribbon roll and winding up the spring n^4 . When the sheet has been printed, the receiving roll R is released and the ribbon flies back to original position on the roll P, the spring n^4 unwinding. The mechanism causing this operation will now be described.

The roll R (Fig. 9) is mounted at its ends in studs S and S', carried by the end frame members A and A'. The stud S' may be screw threaded in the frame, to allow the removal of the roller. The stud S is rigid with the frame and has loosely journaled on it a clutch T which may engage with the counterbored end of the roller. A spring t tends to prevent such engagement. On the clutch T are formed teeth t' which mesh with an idler t^2 , which in turn meshes with the teeth of the main gear H.

On the stud S is a rigid flange t^4 and a loose washer t^5 which are secured by a pin against rotation. Between these washers is a plate t^6 journaled on the stud and having recesses containing balls t^7 . These balls normally occupy also recesses in the washers t^4 and t^5 . If the plate t^6 be rocked on the shaft however, the balls are moved out of their recesses forcing apart the washers t^4 and t^5 and this forces the clutch into engagement with the end of the roller R to cause the same to rotate with the clutch.

The plate t^6 is shifted at the proper time to set the clutch by a rod U connected with the plate t^6 at one end and at the other end with a bell crank U' which carries a roller U² adapted to bear on a segmental cam f mounted on the impression platen. When this roller U² is in engagement with the cam, the rod U holds the clutch T in disengaged position. When, however, the cam releases the roller U², the spring U³ draws the rod U in the direction to apply the clutch and the ribbon is accordingly pulled along concurrently both by the grip of the drums and the rotating roller R. The size of the gear t' and the roller R are so selected that peripheral speed of the roller is substantially the same as that of the drums, so that the ribbon is constantly wound in as it is fed forward by the coöperating surfaces of the drums. At the same time the positive pull of the roller R overcomes any tendency of the spring barrel N to cause backward slippage of the ribbon when gripped between the drums. A weak spring U⁴ surrounding the rod U allows movement

of the rod without jamming the clutch after the clutch is sufficiently tight.

To allow the coil of ribbon to be applied to the spring barrel without unwinding the coil, I mount it on a split sleeve n^6 , this sleeve having one edge n^7 doubled on itself to clamp the ribbon and having the other edge n^8 turned inwardly to occupy a slot in the tube n^3 , preventing slipping. When the head Q is pulled endwise against the spring q , the spring barrel may be removed and the spool slipped into place over it.

In order to feed the paper to the drums at the proper time, so that the paper and the ribbon will pass between them simultaneously, I provide the following mechanism. On the shaft V, rigidly mounted in the arms U' and V^4 , are loose rollers V' . Beneath the rollers are springs V^3 carried by the frame of the machine. These springs are adapted to bear against the under sides of the rollers and form stops for the paper which may be shoved toward the machine along the plate W and beneath the guard W' . The rollers V' being normally stationary, the paper, when shoved against the rollers, stops at the point where the springs V^3 bear against them. As soon as the cam f allows the shaft V to swing downward, the rollers come into contact with the impression platen, and, rotating, draw the paper between them and the ends of the springs and then between the rollers and the platen, forcing it forward, where it passes between the platen and arms V^2 , mounted on the shaft V between the rollers and pressed downward by springs v . These arms V^2 hold the paper in engagement with the impression platen, causing it to pass between the two drums, by which it is drawn forward. To prevent the ribbon from accidentally inking the paper feed rolls V' , I provide guards v' secured to the shaft V and extending over these rolls. The guards also hold the rollers in place.

From what has been described, it will be seen that the cam f initiates simultaneously the paper feed and the ribbon feed, enabling both the paper and the ribbon to be fed between the drums at the same speed as that of the line of type bearing on the impression platen. After the printed sheet is discharged from between the drums, the cam causes the release of the clutch T, as heretofore explained, and the ribbon winds back on to the original roller. A short section of the ribbon may thus be used over and over again until exhausted. When it is exhausted, the clip r which holds the end to the receiving roller is loosened, and the exhausted portion of the ribbon is cut off, the ribbon being again connected to the receiving roller. This method of operation has the advantage over using the ribbon for its full length continuously in that the im-

pressions made by the section are more uniform. Moreover, there is eliminated that wear on the ribbon which is caused by dragging it across the type, when the ribbon is mounted on the drum itself and surrounds the drum.

To replenish the ribbon as it is used, I provide an inking roller X which is adapted to bear directly on the type and ink them, so that the type furnish to the ribbon an amount of ink which corresponds to that which is taken off the ribbon by the impression. This inking roller may also allow direct printing, the ribbon being removed. The inking roller may itself constitute an ink reservoir.

As shown in Fig. 7, the inking roller consists of a felt exterior x mounted on the perforated tube x' which is held by heads x^2 x^3 . The head x^2 is adapted to receive the spring pressed bearing pin x^4 , as shown in Fig. 4, while the head x^3 carries a gear x^6 , which, meshing with the main gear H, furnishes the means of rotation. The head x^3 is hollow to communicate with the interior of the roll, and a filling opening is provided in the head, which, when the roller is in use, is plugged by the screw x^7 . The support for the roller allows its easy removal and for filling with ink either for direct printing or of the proper composition and color to replenish the ribbon.

It should be noted that while I have herein shown and described means for periodically reinking the fabric, such means are not claimed in this application, either broadly or in the specific form shown, but in my application No. 607,346, filed February 8, 1911, as a division hereof.

In printing matter with lines of type acting through a ribbon, it results that where the lines are short, as at the end of paragraphs and elsewhere, a portion of the ribbon is unacted upon, thus, ordinarily, leaving the ribbon comparatively fuller of ink at such points; and this inequality of inking in the ribbon increases with successive impressions of the same matter on the same portion of the ribbon, resulting in giving a comparatively bad impression, when, with change of matter, a full line comes on such portion. For many classes of work this inequality of impression is immaterial and may be disregarded. However, to enable the very best result to be produced, I have incorporated with the ribbon printing my system of inking the type and letting it ink the ribbon. This obviates the difficulty by supplying to the ribbon ink at the exact place where it is removed, and this allows the same short portion of the ribbon to be used over and over again, producing the same impression however the lines of type run. The ribbon is always in good condition until the fabric itself is worn out.

The ribbon may originally be inked independently of the type or it may receive its ink solely from the type. In either case, the amount of ink impressed on the paper is even throughout the page, and thus a close imitation of typewritten matter may be made.

I claim:

1. In a printing machine, the combination of the two members of a printing couple, of an inking ribbon, one end of which is carried independently of the couple, means for causing it to pass between the members during the impressing operation in the direction of feed of material printed, and means for drawing the ribbon back between the impressing operations.

2. In a printing machine, the combination with the two members of a printing couple, of a roll of inking ribbon, and mechanism for causing a short section thereof to reciprocate lengthwise of the ribbon between said members, said section moving in one direction during the impressing operation and in the other between such operations.

3. The combination with the two members of a printing couple, of an inking ribbon adapted to pass between the members while they are impressing, and a spring to draw the ribbon back to original position when not impressing.

4. The combination with a printing member and an impression platen, one of which members is rotary, an inking ribbon having one end supported independently of the couple and arranged to have a section adapted to pass between said members during the impressing, and means to return said ribbon when the machine is not impressing.

5. The combination with two members of a rotary printing machine, of a spring barrel and a ribbon wound thereon adapted to pass between the members while impressing and retracted by the spring when the members are not impressing.

6. The combination with two members of a printing machine, of a spring barrel and an inking ribbon wound thereon adapted to pass between the members while impressing and retracted by the spring when the members are not impressing, and means for engaging the end of the ribbon to draw it along when the machine is impressing.

7. The combination with two members of a rotary printing machine, of a spring barrel, a ribbon wound thereon adapted to pass between the members while printing and retracted by the spring when the members are not printing, and means for engaging the end of the ribbon to draw it along when the machine is printing, said means being geared with one of the members and controlled by a clutch.

8. The combination with two members of

a printing couple, of a spring barrel, an inking ribbon wound thereon adapted to pass between the members in impressing and be retracted by a spring when not impressing, and means for adjusting the spring.

9. The combination with the two members of a rotary printing couple, one of which is adapted for continuous rotation, the printing being effected during a portion of such rotation, means for feeding a ribbon between the members during the printing portion of the rotation and for retracting the ribbon during the non-printing portion of the rotation.

10. The combination with the two members of a printing couple, a fabric mounted in a roll and adapted to pass between the members and having a short section reciprocating between the members in one direction when the members are impressing and in the other direction when not impressing, means to removably engage the free end of the fabric, whereby a section of the ribbon may be printed from and removed when worn out.

11. The combination, in a printing machine adapted to print by continuous rotary movement, of an inking ribbon through which the printing is effected, and mechanism for causing a short section of the ribbon of a length corresponding to a page form to reciprocate during the rotation.

12. The combination in a printing machine, of a roll of inking ribbon having an unwound portion adapted to pass between the members of the printing couple, and means for winding said ribbon off the roll during the printing impression and onto the roll between the impressions.

13. In a printing machine, the combination of the two members of a printing couple, of means for simultaneously feeding paper and an inking ribbon between said members during the impressing operation, and means for retracting the ribbon substantially a page length between the impressing operations.

14. The combination of two members of a printing couple, of an inking ribbon, and automatic means for simultaneously feeding the ribbon and the paper between such members during the impressing operation, and automatic means for retracting the ribbon after the paper is so impressed.

15. The combination with the two members of a printing couple, of a ribbon feeding device, a paper feeding device, and common actuating mechanism for the two devices controlled by said couple.

16. The combination with a rotary printing drum, a rotary impression platen, of a cam movable with one of such members, a ribbon feeding device, paper feeding device, and common actuating mechanism for the two devices controlled by said cam.

17. The combination with the two members of a printing couple, of actuating mechanism movable thereby, a clutch and a paper feed, both adapted to be thrown into action by the movement of such mechanism, and means for feeding a ribbon controlled by such clutch.

18. In a rotary printing machine, the combination with a printing member and a rotary impression platen, of a feed roll, a spring adapted to bear against the same, such spring and roll forming a stop for the paper, and automatic means for bringing the roll into engagement with the impression platen to feed the paper.

19. The combination with the two members of a printing couple, of a shaft movably mounted and carrying rolls, springs adapted to bear against said rolls and form stops for the paper, means for moving said shaft to bring the rolls into engagement with the platen to feed the paper, and a spring carried by said shaft adapted to bear against the platen to guide the paper.

20. The combination with the two members of a printing couple, of a shaft movably mounted and carrying a roll, a spring adapted to bear against said roll and form a stop for the paper, means for moving said shaft to bring the roll into engagement with the platen to feed the paper, a clutch adapted to control the feeding of a ribbon, and an operating connection between the clutch and such shiftable shaft.

21. The combination with the printing member, of an impression platen having a shaft eccentrically mounted, a lever for rotating said shaft, a ring rotatably held on the frame of the machine, a spring detent for the lever carried by said ring, and means for clamping the ring in adjusted position.

22. A printing couple, one member of which is rotary, an inking ribbon passing between the members and drawn forward during the impressing operation, and means for returning the ribbon to initial position between successive printing impressions.

23. A printing couple adapted to print by rotary movement, an inking ribbon passing between the members of the couple and drawn forward as it prints, and means for returning the ribbon to initial position following each impression.

24. A rotary printing drum and an impression platen, an inking ribbon adapted to be gripped thereby and fed forward during printing, and means to retract the ribbon when the printing couple releases its grip thereon.

25. A rotary printing couple, a ribbon adapted to be gripped thereby and fed forward during printing, and a spring to retract said ribbon when the couple releases its grip thereon.

26. A printing couple one member of which is rotary, an inking ribbon passing between the members and drawn forward by the printing operation, and a spring roller on which the ribbon is mounted for returning the ribbon to initial position between successive printing impressions.

27. In a printing device, the combination with a printing couple which prints by rolling contact, of a long ribbon, means for effecting consecutive printing impressions through the same short section of such ribbon, and means whereby such short section may be removed when unduly worn.

28. The combination of a rotary printing couple, an inking ribbon mounted independently of the couple but adapted to pass between the members thereof and move in the direction of their common travel while impressing, and means for retracting said ribbon after such impression.

29. The combination with the two co-operatingly movable members of a printing couple, of an inking ribbon adapted to move between the members while they are impressing, and means mounted independently of the couple for drawing the ribbon backward while the couple is not impressing.

30. The combination with the two members of a printing couple, one of which is rotary, and the other of which has concurrent coöperative movement, of an inking ribbon adapted to pass between the members and move forward with them while impressing and a spring to draw the ribbon backward when the couple is not impressing.

31. The combination of a printing member and an impression platen, one of which is rotary, and both of which move coöperatively during the impressing action, an inking ribbon adapted to pass between said members during the impressing, and means to move said ribbon in the opposite direction a distance corresponding to a page form when the machine is not impressing.

32. The combination of a printing member adapted to carry a page form of type, a coöperating impression platen forming therewith a printing couple, said couple printing by rolling impression, an inking ribbon, a page wide, adapted to pass between said members during the impressing action, and means for moving said ribbon in the opposite direction a distance substantially equal to the length of a page, when the machine is not impressing.

33. The combination of a printing member adapted to turn on an axis, means for removably carrying a page form of individual type on said member, a coöperating rotary impression platen, an inking ribbon, a page wide, adapted to pass between the members of the couple during impressing, and means to draw said ribbon backward

substantially a page length when the couple is not impressing.

34. The combination with two members of a printing couple which prints by rolling contact, of a spring barrel and an inking ribbon wound thereon and adapted to pass between the members while impressing, and being retracted by the spring when the members are not impressing.

35. The combination with two members of a printing couple, one of which is adapted to turn about an axis, a spring barrel and an inking ribbon wound thereon and carried forward between the members during the impression, and means for retracting said ribbon at a portion of the machine's operation when the members are not impressing.

36. The combination with two members of a printing couple, of a spring barrel, an inking ribbon wound thereon, and adapted to pass between the members during impressing and be retracted by the spring when not impressing.

37. The combination with two members of a printing couple, of a spring barrel, a ribbon wound thereon and adapted to pass between the members during impressing and be retracted by the spring when not impressing, a considerable portion of the ribbon being adapted to be wound on said barrel, and the ribbon being adapted to be unwound therefrom to present a fresh face to the type.

38. In a printing machine, the combination with the two members of a printing couple, one of which has movement about an axis while printing, and the other concurrent coöperative movement, of means for simultaneously feeding paper and an inking ribbon between said members during the impressing operation, and means for retracting said ribbon a distance corresponding to a page length between impressing operations.

39. The combination with the two members of a printing couple, one of which is rotary and the other of which has concurrent coöperative movement, of a printing ribbon, automatic means for feeding the ribbon and the paper to be printed simultaneously between the members of the couple during the impressing operation, and automatic means for retracting the ribbon in the opposite direction after the paper is so impressed.

40. The combination with a printing couple, one member of which is rotary, the other of which moves in coöperation, whereby the impression is effected by rolling contact, a spring barrel, an inking ribbon mounted thereon and passing between the members of the couple, and means for supporting and winding in the other end of the ribbon.

41. The combination, with a printing member mounted to turn on an axis, a rotary

coöperative impression platen, a spring barrel mounted parallel with such axis, a ribbon passing forward from the spring barrel between the members of the couple, and means on the other side of the line of contact of the printing member and platen for carrying the forward end of the ribbon.

42. The combination, with a printing member mounted to turn on an axis, a rotary coöperative impression platen, a spring barrel mounted parallel with such axis, a ribbon passing forward from the spring barrel between the members of the couple, and means on the other side of the line of contact of the printing member and platen for carrying the forward end of the ribbon, and mechanism for rotating such means to wind in the said forward end.

43. In a rotary printing machine, the combination of a rotary member adapted to carry a page form of individual type, a rotary coöperating under-running impression platen, a spring barrel mounted independently of such members but parallel with their axes, and a ribbon mounted on the spring barrel and passing between the members of the couple.

44. In a rotary printing machine, the combination of a rotary member adapted to carry a page form of individual type, a rotary coöperating under-running impression platen, a spring barrel mounted independently of such members but parallel with their axes, a ribbon mounted on the spring barrel and passing between the members of the couple, and a rotatable barrel on the other side of the line of contact of the couple arranged to carry the forward end of the ribbon.

45. The combination of a printing couple, one member of which is rotary, an inking ribbon mounted independently of the couple and passing between the members of the couple and drawn forward during the impressing operation, and means for drawing said ribbon backward between successive printing impressions.

46. The combination of a printing couple, one member of which turns about an axis and the other of which has coöperative concurrent movement, an inking ribbon adapted to be gripped between the members of the couple and fed forward during the printing, and means to retract the ribbon when the printing couple releases its grip thereon.

47. The combination of a printing couple, one member of which turns about an axis and the other of which has coöperative concurrent movement, an inking ribbon adapted to be gripped between the members of the couple and fed forward during the printing, and a spring to retract the ribbon when the printing couple releases its grip thereon.

48. The combination of a printing couple,

one member of which has rotary movement during printing, an inking ribbon passing between the members of the couple and drawn forward by the printing operation, and a spring barrel on which the ribbon is mounted.

49. The combination of a printing couple, one member of which has rotary movement during printing, an inking ribbon passing between the members of the couple and drawn forward by the printing operation, and a spring barrel on which the ribbon is mounted, the forward movement of the ribbon tightening the spring and the retraction of the spring drawing the ribbon backward.

50. The combination with a printing member, of an impression platen having a shaft eccentrically mounted, a lever for adjusting said shaft, a shiftable member held on the frame of the machine, a spring dent for the lever carried by said member, and means for clamping the member in adjusted position.

51. In combination with a type-carrying cylinder and a platen roller, a printing ribbon drawn forward by the grip of said roller and the type on said cylinder and means drawing backward on said ribbon against the forward pull of said type and platen roller, in order that the ribbon may be automatically returned to its first position when the grip of said type and roller ceases.

52. In a printing machine, the combination with a rotary printing cylinder, of a ribbon carried by spools mounted independently of the cylinder, and means operated by the rotation of the cylinder for intermittently shifting said ribbon from one spool to another.

53. In a printing machine, the combination with a rotary printing cylinder, of a ribbon carried by spools mounted independently of the cylinder, and means for shifting said ribbon from one spool to another reversely to the movement of the cylinder.

54. In a printing machine, the combination with a rotary printing cylinder, of a ribbon carried by spools mounted independently of the cylinder, and means operating intermittently to shift the ribbon from one spool to another past the printing point during the rotary movement of the cylinder.

55. A printing machine embodying a rotary printing cylinder and platen, a ribbon carried by spools mounted independently of the cylinder and passing between the cylinder and the platen, and means operating to shift the ribbon from one spool to another past the printing point during the rotary movement of the cylinder.

56. The combination of a printing member and platen, one of which turns on an axis during impression, an inking ribbon having an end mounted independently of the printing member, and means for feeding

paper between the ribbon and platen while such axial turning is in progress.

57. The combination of a couple which prints by rolling impression, an inking ribbon adapted to furnish the ink for such impression, and a spring barrel on which the ribbon is wound the ribbon moving during the impression.

58. The combination of a rotary type drum, rotatable during the impression operation, an impression platen, and an inking ribbon coöperating with the two and mounted independently of the drum.

59. The combination of a printing couple, which prints by rolling contact an inking ribbon mounted independently of the couple, and means for reciprocating a page length of such ribbon between the couple.

60. The combination of a printing couple one member of which is rotary and both members of which move coöperatingly while printing, an inking ribbon, and means for feeding the ribbon substantially a page length at a time.

61. The combination of a printing couple adapted to print a page form by rolling contact, an inking ribbon, means for feeding substantially a page length of ribbon between the members of the couple during the impression, and means for returning substantially a page length of ribbon between the members of the couple between impressions.

62. The combination of a rotary type form, a platen whose coöperating surface is substantially as great as that of the form, an inking ribbon, and means independent of the member which carries the form for carrying the ribbon.

63. The combination of a couple which prints by rolling contact, both members moving during the impression, and an inking ribbon having a portion mounted independently of the couple but adapted to pass between the members thereof and move in the direction of their common travel while impressing, and means for returning said ribbon after such impression.

64. The combination with the two members of a printing couple, which roll on each other during impression an inking ribbon adapted to pass between the members while they are impressing, and a spring to draw the ribbon backward when not impressing.

65. The combination with the two members of a printing couple, of an inking ribbon adapted to pass between the members while they are impressing, and means independent of the couple for winding up the ribbon on the forward side during the impression.

66. The combination of a printing couple, one member of which is rotary, an inking ribbon lying between the members and movable in one direction during the impressing

operation, and means for moving the ribbon in the other direction substantially a page length between successive impressions.

67. The combination of a printing couple formed to print by rolling contact, an inking ribbon adapted to be gripped and fed during the impression, and means mounted independently of the couple to take up the ribbon on the advance side.

68. The combination of a printing couple, one member of which is rotary, an inking ribbon passing between the members and moving in one direction by the printing operation, and a roller upon which the ribbon is mounted for moving the ribbon in the opposite direction between successive printing impressions.

69. The combination of a printing couple mounted to print by rolling contact, an inking ribbon having an end mounted independently of the couple but adapted to lie between the members thereof and move in the general direction of their successive lines of contact, and means for moving said ribbon in the opposite direction after such impression.

70. In a printing machine, the combination of a traveling member carrying a letter form, an inked ribbon stretched across such form and attached at one end to means carried by the frame of the machine, and a platen to press a sheet of paper upon the ribbon against the form as the form moves through the printing position.

71. In a printing machine, the combination of a movable member carrying a letter form, an inked ribbon stretched across such form and attached at one end to means carried by the frame of the machine, means for feeding said ribbon at each operation of the machine, and a roller platen to press a sheet of paper upon the ribbon against the form as the latter moves coöperatingly through the printing position.

72. The combination of a type carrying member and a rotary impression platen, a fabric adapted to pass between them and having one end carried by a roller, a spring barrel carrying the other end of the fabric whereby the fabric winds on and off the spring barrel with each complete operation of the printing member.

73. The combination in a duplicating machine, of a type carrying member and a co-operating platen, a roller, a spring barrel, a ribbon running from the spring barrel to the roller, and traveling on and off the spring barrel with each complete operation of the machine, and means for imparting rotation to the roller to wind the ribbon.

74. In a duplicating machine, the combination of a printing member formed to carry type, a rotary impression platen, a spring barrel located parallel with the impression platen, an inking ribbon adapted to extend

from the spring barrel between the impression platen and type carrying member, and means for guiding paper between the inking ribbon and the impression platen.

75. In a printing machine, the combination of a movable member, a printing form carried by said member, a spring roller on the frame beyond the printing position, another roller, a ribbon attached at its ends to said rollers and means for automatically turning such other roller at each operation of the machine.

76. In a printing machine, the combination of a movable member, a printing form carried thereby, an inking ribbon having at least one end mounted independently of said member stretched across the member and through which said form prints, and a paper feeding roller movable bodily and intermittently into operative position to feed a sheet of paper into printing position.

77. The combination of a type carrying member, an impression platen, a spring barrel, an inking ribbon mounted thereon, and adapted to lie between the type carrying member and platen, a paper feed roller, and means for automatically moving it to feed a sheet of paper to printing position.

78. In a printing machine, the combination of a movable member carrying a form to be printed, a ribbon through which said form prints, a roller independent of said member carrying one end of the ribbon, a discharge table arranged at an angle, and means for feeding the sheet to be printed to printing position and onto the discharge table.

79. The combination with a printing member, of a rotary coöperative impression platen, a spring barrel mounted parallel with the axis of the platen, a ribbon passing from the spring barrel between the members of the couple, and means on the other side of the line of contact of the printing member and platen for carrying the other end of the ribbon.

80. The combination with a printing member mounted to turn on an axis, a rotary coöperative impression platen turning on a parallel axis, two rollers mounted on opposite sides of the line of contact of the platen, and printing member, and an inking ribbon extending from one of said rollers to the other.

81. The combination with a printing member mounted to turn on an axis, a rotary coöperative impression platen turning on a parallel axis, two rollers mounted on opposite sides of the line of contact of the platen and printing member, an inking ribbon extending from one of said rollers to the other, and means for positively driving one of said rollers to wind in the ribbon.

82. In a rotary printing machine, the combination of a rotary member adapted to

carry a page form of individual type, a parallel rotary coöperating under-running impression platen, a pair of rollers mounted independently of such members but parallel with their axes, a ribbon passing between the members of the couple and having its ends mounted on said rollers, and means for rotating one of said rollers.

83. The combination with a type carrying cylinder and a platen roller, of an inking ribbon drawn forward by the grip of said roller and the type on said cylinder, two rollers on which the ends of said ribbon are wound, and means for driving one of said rollers.

84. In a printing machine, the combination of a movable member, a printing form carried by said member, a spring roller on the frame of the machine, another roller, an inked ribbon attached at its ends to said rollers, and means for automatically feeding said ribbon at each operation of the machine.

85. In a printing machine, the combination of a movable member, a printing form carried by said member, a spring roller on the frame of the machine beyond printing position, a roller at the other side of the printing position, an inked ribbon attached at its ends to said rollers, and ribbon-feeding mechanism for the last mentioned roller adapted to operate at each operation of the machine.

86. The combination of a movable printing member and a rotary impression platen, an inked fabric adapted to pass between them and having one end carried by a roller, and a spring barrel carrying the other end of the fabric, the fabric winding on and off the spring barrel with each complete cycle of the member.

87. The combination in a duplicating machine, of a type carrying member and a co-operating platen, a printing fabric adapted to pass between them, a ribbon spool, a spring barrel, a ribbon running from the spring barrel to the ribbon spool and traveling on and off the spring barrel with each complete operation of the machine, and means for turning the spool to wind the end of the ribbon opposite the spring barrel.

88. The combination in a duplicating machine, of a type carrying member and a co-operating platen, a printing fabric adapted to pass between them, a ribbon spool, a spring barrel, a ribbon running from the spring barrel to the ribbon spool, and traveling on and off the spring barrel with each complete operation of the machine, a paper feed roller, and means for periodically moving the same into active position.

89. The combination of a rotary platen, a coöperating rotary form member, a fabric extending between the form member and platen, rollers independent of the form

member and platen for carrying the ends of the fabric, means for feeding paper between the fabric and platen, and means consequent upon the rotation of the couple for feeding the fabric.

90. The combination, with the frame of the machine, of a rotary under-running roller platen, a rotary type-carrying drum above the platen, an inked ribbon extending between the drum and platen, a pair of rollers on opposite sides of the drum and platen and parallel therewith for carrying the ends of the ribbon, means for feeding paper beneath the ribbon and above the platen, the ribbon passing with the paper between the members of the couple, and means for giving the ribbon another movement to cause it to present the desired face to the type.

91. The combination, with the frame of the machine, of a rotary under-running roller platen, a rotary type-carrying drum above the platen, an inked ribbon extending between the drum and platen, a pair of rollers on opposite sides of the drum and platen and parallel therewith for carrying the ends of the ribbon, means for feeding paper beneath the ribbon and above the platen, the ribbon passing with the paper between the members of the couple, and a spring acting on one of said rollers for retracting the ribbon following the printing impression.

92. The combination of a roller platen, a coöperating type-carrying drum, a fabric extending between them, the fabric being adapted to be fed forward by the grip of the drum and platen, rollers independent of the drum for carrying the ends of the fabric, means for turning the roller on the advance side to take up the fabric during the impressing, and means for turning the roller on the rear side after the impression to wind back the ribbon.

93. The combination, with the printing form and platen, of an inking ribbon stretched between the two, a paper feed roller movable intermittently and bodily into active position, and a spring barrel for carrying one end of the ribbon, the ribbon winding on and off the spring barrel with each complete operation of the machine.

94. The combination, with a rotary printing couple, of an inking ribbon, a spool therefor, and means for winding the ribbon on and off the spool with each complete operation of the machine.

95. The combination with a printing couple composed of two members which have rolling co-action, an inked fabric extending between them, through which the printing impression is effected, a roller for said fabric, and means for winding the fabric on and off the roller for each complete operation of the machine.

96. The combination with a printing couple composed of two members which have

rolling co-action, an inked fabric extending between them, through which the printing impression is effected, a roller for said fabric, means for winding the fabric on and off the roller for each complete operation of the machine, a paper feed roller, and means for moving it bodily into active position.

97. The combination of a roller platen, a movable form member cooperating therewith, an inked fabric extending between the two, a spring barrel carrying one end of the fabric, a roller carrying the other end of the fabric, the fabric winding on and off the spring barrel with each complete operation of the machine, a paper feed roller, and means for driving the platen and form member and automatically moving the paper feed roller bodily into active position.

98. The combination of a printing couple one member of which is rotary, an inked ribbon passing between the members and having one end mounted off of the couple, means for feeding paper to the couple, and a guard to support the ribbon out of contact with the paper.

99. The combination with the two members of a printing couple, of an independently mounted ribbon spool, an inking ribbon wound thereon and passing between the members of the couple, means for feeding paper between the platen and ribbon beneath the ribbon, and a rod transverse of the ribbon for supporting it out of contact with the paper feeding means.

100. The combination with two members of a printing couple, of an inking fabric, a spring barrel for carrying one end of the fabric, the fabric being adapted to lie between the members of the couple, a bodily movable paper feed roller, and means operated concurrently therewith for winding the other end of the ribbon.

101. The combination with two members of a printing couple, of an inking ribbon adapted to lie between them, a roller for winding in one end of the ribbon, a clutch for controlling the rotation of such roller, a paper feed roller, and a connection between the paper feed roller and the clutch to cause their concurrent operation.

102. The combination of a movable form-carrying member, a cooperating platen, one having rolling contact on the other during

printing, an inking ribbon passing between the form-carrying member and platen and traveling forward during impression, and means mounted independently of the form-carrying member and platen for retracting said ribbon.

103. The combination of a movable printing member, a cooperating rotary platen having rolling contact therewith during printing, an inked fabric extending between the two, a roller independent of the printing member and platen and engaging the ribbon, and means for rotating said roller to retract the ribbon.

104. The combination, with a movable printing member and a cooperating platen having rolling contact therewith during printing, of an inked ribbon extending between such members and movable with them during printing contact, and a spring barrel mounted independently of the printing member and having one end of the ribbon upon it.

105. The combination, with a rotary printing couple adapted to feed forward material between the members of the couple, of an inking ribbon extending between said members and fed forward during impression, a roller independent of the couple carrying the end of the ribbon, and a spring tending to turn said roller in the direction to retract the ribbon.

106. The combination, with a movable printing member, of a cooperating rotary impression platen, an inking ribbon passing between the two and adapted to be fed forward by the grip of the members of the couple, a roller on which the ribbon is wound at the rear of the line of printing contact, another roller on which the ribbon is wound at the front of the line of contact, a spring acting on the roller at the rear tending to retract the ribbon, and a guide for directing the paper to be printed between the last-mentioned roller and the platen and into contact with the platen and the inking ribbon.

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

HARRY C. GAMMETER.

Witnesses:

ALBERT H. BATES,
G. H. MYERS.