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C. GABRIELSON

1,967,709

MEANS FOR INKING TYPE IMPRESSIONS

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Fig. 1.

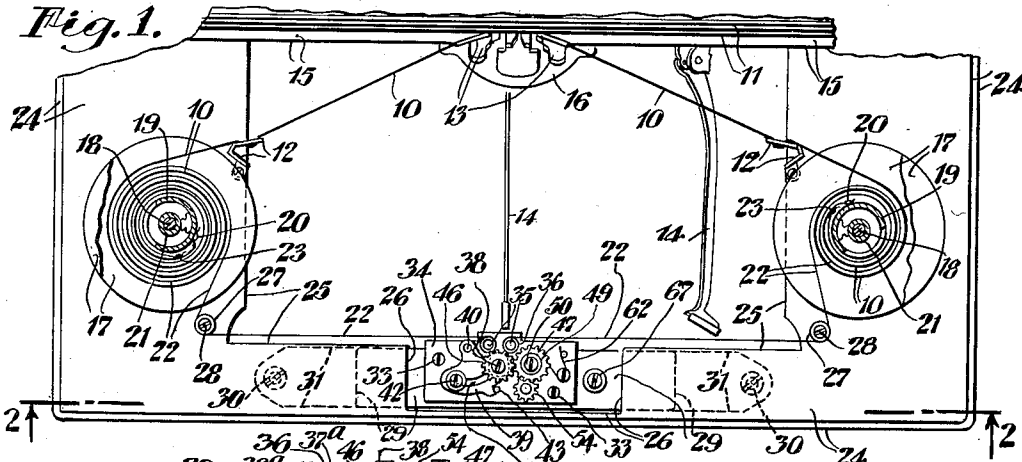


Fig. 2.

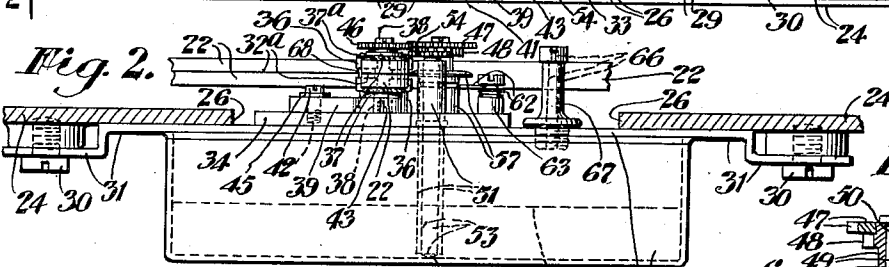


Fig. 3.

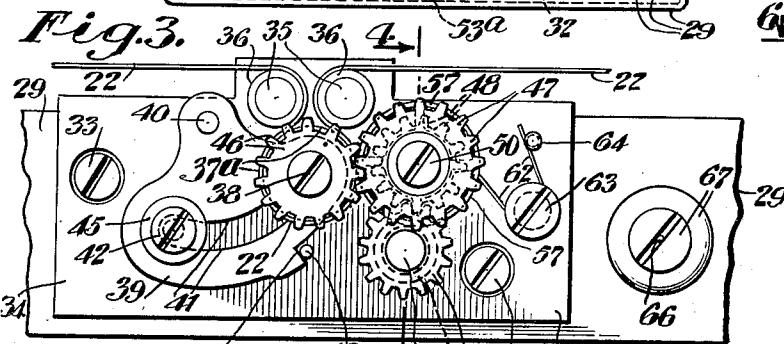


Fig. 5.

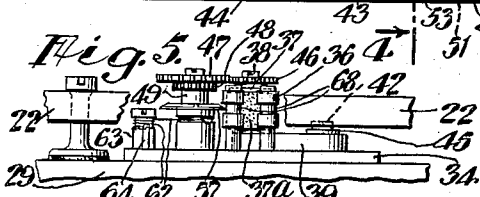


Fig. 6.

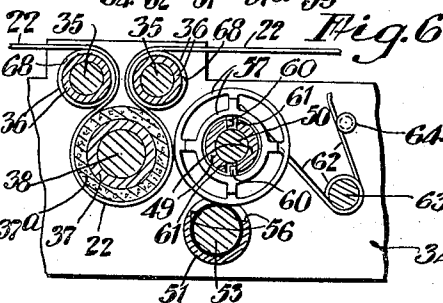


Fig. 7.

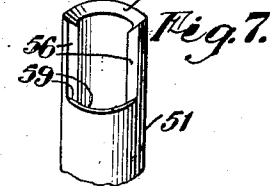


Fig. 8.

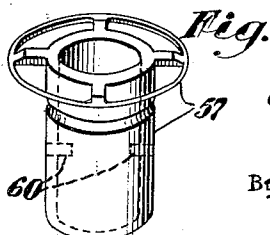
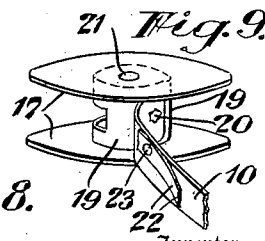


Fig. 9.



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UNITED STATES PATENT OFFICE

1,967,709

MEANS FOR INKING TYPE IMPRESSIONS

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Application December 2, 1932, Serial No. 645,364
Renewed March 14, 1934

39 Claims. (Cl. 197—171)

This invention relates to improvements in means for inking type impressions. The improvements relate particularly to printing machines of the kind wherein type impressions are inked through the medium of a printing ribbon which is interposed between the type and paper during the making of the type impressions. Typewriting machines and calculating machines are well known examples of printing machines of this kind.

Important objects of the invention are to provide simple and efficient means for automatically replacing the minute quantity of ink removed from the printing ribbon at each printing operation of the machine; to provide means for automatically maintaining a uniform supply of ink in the printing ribbon over long periods of use, whereby the printing ribbon may be used until the fabric of which it is formed is worn out by the actions of the type thereon without variation in the quality of the inked impressions made by the machine; to provide means for re-inking the printing ribbon during operation of the machine without imposing injurious strains and pressure upon the ribbon or an injurious or burdensome load upon the ribbon feeding mechanism of the machine; to provide simple, efficient and easily driven means for lifting ink from an ink reservoir and applying it in minute quantity at a time to the printing ribbon; to provide an improved ribbon-driven device for elevating and depositing ink from a reservoir upon a ribbon driving said device; to provide an efficient and easily driven re-inking means for re-inking the printing ribbon with pigment ink in small regulated quantity per unit of length of the ribbon during operation of the machine; and to provide an improved device for holding a supply of pigment ink and lifting such ink in minute quantity at a time from the supply and depositing it in minute quantity at a time upon a ribbon, and, more particularly to provide a device such as described which may be actuated by endwise feeding in either direction past said device of a ribbon to be inked by the device.

Other objects and advantages of the invention will appear from the following description of the embodiment thereof in a well known form of typewriting machine shown in the accompanying drawing.

In the drawing, Fig. 1 is a fragmentary plan view of the typewriting machine equipped with a preferred form of impression inking means embodying the invention;

Fig. 2 is a fragmentary sectional view on the line 2—2 of Fig. 1;

Fig. 3 is a detail plan view on an enlarged scale showing parts of the inking means disclosed in Fig. 2;

Fig. 4 is a sectional view on the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary rear view of the parts of the inking means shown in Fig. 2;

Fig. 6 is a fragmentary sectional view on the line 6—6 of Fig. 4;

Fig. 7 is a fragmentary perspective view of the upper end of the tube or stator housing the ink-lifting roller or rotor of the ink-lifting pump;

Fig. 8 is a perspective view of the ink transfer wheel; and

Fig. 9 is a detail perspective view of one of the ribbon feed spools and the adjacent end portions of the two ribbons, showing how the ribbons are attached to each other and to the two spools.

The improvements are shown embodied in a preferred form thereof in a well known visible printing typewriting machine disclosed in patents to Carl Gabrielson, No. 929,933, granted August 3, 1909, and No. 958,388, granted May 17, 1910. Only so much of said machine as is necessary for a full understanding of the present invention is shown, reference being made to said patents for further information as to the construction of the machine.

The usual printing ribbon or impression inking ribbon 10 of the machine is fed longitudinally by the usual reversible ribbon feeding mechanism of the machine and is guided between the spools over the printing point on the platen 11 by the usual stationary guides 12 and the usual up and down vibrating ribbon guide 13 to interpose said ribbon between the types and paper at the printing strokes of the usual pivoted type bars. Some of the type bars are shown and designated 14. The platen is mounted on the usual platen carriage 15, and the vibrating type guide 13 slides up and down as usual on the usual type guide 16 at the type bar strokes to cause ribbon 10 to cover and uncover the printing point, said guide being actuated by the usual universal bar, not shown.

The ribbon 10 is fed past the printing point and reeled up first at one side and then the other of the printing point automatically during operation of the machine by the usual reversible ribbon feeding mechanism, including the two ribbon feed spools 17 and the usual two alter-

nately driven spool shafts 18 to which said spools are clutched to rotate with the shafts. Ribbon 10 is, as usual, inked prior to insertion in the machine and is formed, as usual, of absorptive fabric, preferably thin silk. The ends of ribbon 10 are attached to core portions 19 of the spools by means of the usual prongs 20 projecting from said core portions, said spools being mounted on and clutched to shafts 18 by means of the usual hub-portions 21 of the spools.

The spools project as usual above the usual top plate 24 of the main frame of the machine, which plate has the usual central opening 25 through which the type bars 14 strike to the usual common printing point on the platen, which point is as usual in the medial fore-and-aft vertical plane of the machine. The improvements will now be described.

The improved machine, in addition to the absorptive and pre-inked printing ribbon 10, is provided with a non-printing ribbon 22. This ribbon 22 is preferably not inked prior to insertion in the machine, and serves as an ink-conveyor for use in re-inking ribbon 10 automatically during operation of the machine. This ink-conveying ribbon 22 is preferably formed of a fabric or material which is not absorptive of ink. Ribbon 22 is also preferably made as thin as possible so that ribbons of maximum length may be accommodated on the spools, and the material of which it is formed is also preferably impervious by ink so that ink cannot pass through the ribbon.

In accordance with the present invention, the ink with which the printing ribbon 10 is impregnated prior to insertion in the machine is pigment ink, i. e. ink wherein the coloring matter is a pigment held in suspension in a suitable vehicle, as distinguished from other inks employed for printing ribbons (commonly known as dye inks) wherein the coloring matter (usually a dye) is in solution in a suitable vehicle.

The two ribbons 10 and 22 are connected to the ribbon feeding mechanism to interwind face to face on the feed spools 17. Preferably ribbon 22 is fastened at its ends to ribbon 10 near the ends of ribbon 10 as by eyelets 23, ribbon 22 preferably being relatively narrow as compared to ribbon 10 and being so secured by the eyelets 23 as to interwind with the upper longitudinal half of ribbon 10 on each feed spool, as shown.

The front transverse portion of the top plate 24 of the machine is cut away medially of the machine from its rear edge nearly to its front edge to form a wide notch or bay 26 opening into the central opening 25 in said top plate. Ribbon 22 is guided across the machine between the spools adjacent the forward edge of opening 25 (by means which will now be described) and actuates ink supplying means (hereinafter described) which deposits ink upon this ink-conveying ribbon during feeding of the two connected ribbons. Ink deposited on ribbon 22 is carried thereby into the coils of ribbon 10, as the two ribbons are interwound on either spool, and is there taken up by the absorptive printing ribbon 10.

Ribbon 22 passes around the front and outer sides of two idle guide pulleys 27, there being one of these pulleys journaled on an upstanding vertical pivot 28 on top plate 24 forward of each ribbon feed spool. An ink supply holding tank or reservoir 29 is detachably suspended from and

below the front transverse portion of top plate 24 by a pair of screws 30 screwed into said plate and passing through two supporting ears 31 forming end extensions of the top wall of the ink reservoir. The top wall of the reservoir extends across the cut-out or bay 26 in the front transverse portion of the top plate 24 of the machine frame. In use said reservoir holds a supply of ink 32 corresponding in kind and color with the ink with which printing ribbon 10 is originally impregnated. Preferably ink 32, as in the case of the original ink supply of ribbon 10, is pigment ink.

Detachably held to the upper face of the top wall of the ink reservoir by a pair of screws 33 is a flat horizontally disposed supporting plate 34 which lies in the bay 26 cut in top plate 24 of the machine frame. Journaled on a pair of vertical pivots 35 carried by supporting plate 34 are a pair of twin idle pulleys 36 which are closely juxtaposed and are located adjacent the rear open end of the bay 26 in the top plate 24 substantially opposite the printing point on the platen and substantially midway the two ribbon feed spools, which spools are, as usual, equidistant from the printing point and located adjacent the two opposite sides of the machine frame. Immediately forward of the twin pulleys 36, which are preferably of small diameter as shown, is a much larger ribbon-driven pulley 37 rotating on a vertical axis and having a cork friction surface 37^a.

Ribbon 22, at a point substantially midway the feed spools, passes in a horseshoe bend forward between the twin pulleys 36 to and around the right and left hand sides and the front of the larger ribbon-driven pulley 37. Ribbon 22 thus has a strong tractive grip on pulley 37 for rotating said pulley in either direction without any injurious strain being imposed on the ribbon feeding mechanism of the machine and without subjecting ribbon 22 either to injurious strain or heavy pressure.

Pulley 37 is, for the purpose of actuating said devices, geared to devices for lifting ink from the reservoir and depositing the lifted ink upon ribbon 22. The pulley 37 is journaled on a vertical pivot 38 carried by and upstanding from a horizontally adjustable arm 39 pivoted on a vertical pivot 40 carried by supporting plate 34 to the left of the set of pulleys 36. This arm 39 has an arcuate slot 41 therein concentric with pivot 40 and is normally immovably clamped to plate 34 (by a clamping screw 42 threaded in plate 34 and passing through slot 41) with pulley 37 located immediately in front of the twin pulleys 36. A stop pin 43 on plate 34 and a stop shoulder 44 on arm 39 are normally engaged and serve to prevent pulley 37 being adjusted close enough to pulleys 36 to exert injurious clamping pressure on ribbon 22. A washer 45 may be interposed between the head of screw 42 and arm 39, as shown. By loosening the clamping screw, arm 39 may be swung forward and to the left to permit ribbon 22 to be threaded about the pulley or to be removed from the machine with ribbon 10. The means driven by the pulley 37 for lifting ink from a reservoir and depositing the ink upon ribbon 22 will now be described.

A pinion 46 is fixed on the upper end of the hub of pulley 37 and normally meshes with the upper and larger one 47 of two pinions 47 and 48 rigid with the upper end of a hub 49. The common hub 49 of the pinions 47 and 48 is

journalled on a vertical pivot 50 upstanding from supporting plate 34 to the right of pulley 37.

Forward and to the right of pulley 37 and the path of swinging adjustment of said pulley, and forward and to the left of pivot 50, there is located the projecting upper end portion of a rigid vertical tube 51 of non-absorptive material such as steel or brass. This tube is non-rotatably supported by the top wall of the ink reservoir in any suitable manner, as by being tightly swaged in a circular aperture in said wall with an annular collar 52 on said tube abutting the upper face of said wall as shown. The lower end of tube 51 is slightly spaced from the bottom wall of the ink reservoir to permit any ink 32 in the reservoir to flow to the open lower end of said tube.

Substantially filling the bore of said tube 51 is a roller 53 of non-absorptive material such as steel or brass, which roller has, however, a loose turning fit in the tube, as indicated by heavy lines in Figs. 4 and 6, to permit a very thin film of ink to be advanced up the peripheral surface of the roller 53. Roller 53 has a rounded lower end 53^a resting and rotating on the bottom wall of the ink reservoir 29. Roller 53 projects above the upper end of tube 51 and has a pinion 54 fixed on its upper end and meshing with the pinion 48. Below pinion 54, and at the upper end edge of tube 51, roller 53 is provided with an annular groove 55 which serves to prevent ink from the reservoir advancing up the roller beyond the upper end of the tube. The upper end edge of the tube is beveled downward and inward at a steep angle as shown at 58 to drain surplus ink back into the tube. At the rear, facing pivot 50, the upper end portion of the tube is notched or slotted at 56 to permit the periphery of an ink-transfer wheel 57 to turn in contact with the periphery of roller 53 below groove 55. The lower edge of slot 56 is also beveled downward and inward at a steep angle as shown at 59 to at this point drain any surplus ink back into the tube. Tube 51 is a non-absorptive housing, cylinder or stator of a rotary ink-lifting pump having a non-absorptive rotor or impeller comprising the roller 53.

The ink-transferring wheel 57 is formed of non-absorptive material, such as steel or brass, and has its hub loosely encompassing the pinion hub 49 (as shown) for limited universal floating movement of wheel 57 in a horizontal plane. This wheel has a thin annular ink-carrying rim beveled downward and outward at a steep angle to substantially a dull knife edge and supported by the outer ends of horizontally extending spokes which connect said rim to the wheel hub. This wheel rim picks up only a very minute quantity of ink from roller 53 per revolution of the wheel and retains this minute quantity of ink at the outer edge of the wheel rim.

A pair of opposed radially arranged clutch pins 60 carried by the hub of wheel 57 are constantly engaged in two diametrically opposed vertical slots 61 in pinion hub 49. The length and diameter of pins 60 are such that they may move to a limited extent in such slots both radially and laterally of the hub 49 so that wheel 57 rotates with said pinion hub but is free to move or float laterally relatively to said hub in a horizontal plane to a limited extent. A light spring 62, coiled about an anchor screw 63 secured to plate 34, has one end abutting a stud 64 on plate 34 and its other end bearing

against the hub of wheel 57 at a point to the rear and right of pivot 50 to constantly lightly urge wheel 57 laterally into contact with the roller 53 and also with the ribbon 22. Wheel 57 engages ribbon 22 with its periphery at a point at the right of pulley 37 where the ribbon is backed by the said pulley, i. e. at a point where the pulley and wheel make opposing contacts with opposite faces of the ribbon 22. The floating and spring-pressed ink-transfer wheel 57 automatically adjusts itself to compensate for inequalities in pulley 37, roller 53 and ribbon 22 and will not injure ribbon 22 notwithstanding the fact that said wheel has substantially a dull knife edge at its periphery.

A filling aperture in the top wall of the ink reservoir to the right of plate 34 is closed by a screw cap 67 which projects up into bay 62 in top plate 24 and is provided with a bleeder passage or air vent 66.

Each of the pulleys 36 is provided with an annular groove 68 at the level of the periphery of ink transfer wheel 57, so that when the ribbons are reeled in either direction a line of ink 32^a deposited on ribbon 22 by the wheel will not be contacted by that one of the pulleys 36 around which the inked portion of ribbon 22 is fed. In the drawing the ribbons are assumed to be reeling up on the left hand spool and unreeling from the right hand spool, and ribbon 22 (as indicated in Fig. 2) to be carrying a line of deposited ink 32^a toward the left-hand spool into the reeling up convolutions of ribbon 10.

During operation of the machine the types force ink from printing ribbon 10 at the printing point on platen 11 in the usual manner in forming impressions, ribbons 10 and 22 being gradually reeled up on one spool and, when the other spool is fully unreeling, being then gradually reeled up on the latter spool, and so on by the usual printing ribbon feeding mechanism.

The feed movement of ribbon 22 in either direction rotates pulley 37—37^a which in turn positively rotatively drives wheel 57 and roller 53 in directions which reverse with the reversal of direction of feed of ribbon 22. Rotation of roller 53 in either direction in tube 51 causes a very thin film of ink from the ink supply 32 in reservoir 29 to climb or advance up the periphery of roller 53 to the periphery of wheel 57 due to the lifting effects of the relative rotation of the tube and roller elements of the rotary ink-lifting pump, the viscosity of the ink, and the capillary attraction of the roller and tube for the ink. The very thin ink transfer periphery of the spoked transfer wheel 57 removes lifted ink from roller 53 in very minute quantity per revolution of the wheel and deposits it upon one face of ribbon 22 on which the deposited ink forms a thin line 32^a of ink of film depth along the longitudinal medial line of said ribbon 22. The point of deposit of ink on ribbon 22 is midway (or substantially midway) the ribbon spools, so that all used portions of ribbon 10 will be re-inked as the ribbons are interwound on the spools alternately in the course of use of the machine.

The two ribbons are preferably reeled on each spool in the interwound relation shown so that the ink discharge face of ribbon 10 takes up the ink carried on the ink conveying face of ribbon 22. The pulley system and the gear train described provide for a uniform driving of pulley 37 by ribbon 22 without subjecting said ribbon

to injurious pressure and strain and without subjecting the ribbon feeding mechanism to undesirable strain or load, and also provide for the lifting and depositing on ribbon 22 of a uniform and regulated minute quantity of ink per given unit of length of ribbon 22. Each used given unit of length of ribbon 10 may thus be re-inked with a given amount of ink from the reservoir regulated to correspond with the amount of ink driven from said portion of ribbon 10 between the successive re-inkings thereof. Each reeled-up coil of ribbon 10 receives conveyed ink from only one coil of the impervious ink-conveying ribbon 22.

It is thus possible to obtain uniform impressions over much longer periods than usual from a printing ribbon and also to use a thin and lightly inked printing ribbon for a long period of time. It is also possible to use the printing ribbon until the ribbon fabric becomes worn through, instead of using the ribbon as heretofore only until part of its original ink supply is driven therefrom. Since the means for inking ribbon 22, which ribbon in turn inks ribbon 10, are non-absorptive of ink, and ribbon 22 is non-absorptive of ink, it is also possible to successfully re-ink with pigment ink without straining out the pigment from the pigment-carrying vehicle. The most common vehicles for the pigment in pigment ink are heavy oily material or viscous varnish-like material. The use of such ink in machines employing a printing ribbon and re-inking means therefor is highly desirable but it is difficult to properly regulate the re-supply of such ink without elaborate mechanism requiring considerable power for operation. The present invention provides effective and compact re-inking means for handling such ink and requiring very little power for operation.

The ink lifting and depositing means for ribbon 22 may be employed to directly ink a printing ribbon instead of a re-inking ribbon for a printing ribbon.

The use of a yieldingly floating wheel makes possible the use of a substantially knife edge wheel without danger of cutting ribbon 22. The gear train ratio is such that pulley 37—37^a, wheel 57 and roller 53 turn at equal peripheral speed so that wheel 57 does not rub or frictionally drag on ribbon 22 or roller 53 and so that minimum power is required to drive said pulley and wheel and roller from ribbon 22 and the ribbon feed mechanism of the machine. The beveled annular periphery of the spoked wheel 57 retains ink picked up from roller 53 at the contact periphery of wheel 57.

What I claim is:

1. The combination in a printing machine having a printing ribbon fed back and forth across a printing point, and printing mechanism coactive with said printing ribbon to make inked impressions, of an upright and non-absorptive roller; means for maintaining a supply of ink at the lower end of said upright roller; stationary means extending longitudinally of said roller and coactive therewith during rotation of the roller to force a film of ink from said supply up the periphery of said roller; a rotary and non-absorptive ink transfer device peripherally contacting the roller periphery adjacent the upper end of the roller; and a non-absorptive ink-conveyor ribbon fed back and forth with one face thereof contacting the printing ribbon at both sides of the printing point and in

contact with the periphery of the rotary ink transfer device, said ink-conveyor ribbon being constantly withheld from impressing action of the printing mechanism of the machine thereon.

2. In a printing machine having a printing ribbon; ribbon feeding means, including a pair of feed spools, for reeling the printing ribbon back and forth; and printing mechanism coactive with the printing ribbon between the spools to make inked impressions; the combination of an ink-conveyor ribbon which interwinds face to face with the printing ribbon on the feed spools and is withheld from impressing action of the printing mechanism thereon; a pulley driven by said conveyor ribbon at a point between the feed spools; an upright and non-absorptive roller positively rotatively driven from said pulley in opposite directions in accordance with the direction of reeling of the ribbons; means for maintaining a supply of ink at the lower part of said roller; stationary means extending along said roller and coactive therewith during rotation of the roller in either direction to force a film of ink from said supply up the periphery of the roller; and a reversely rotative and non-absorptive ink transfer device contacting with its periphery the periphery of said roller at the upper part of the roller and also contacting with its periphery one face of said ink-conveyor ribbon at a point on said ribbon between the feed spools.

3. In a printing machine having a printing ribbon; ribbon feeding means, including a pair of feed spools, for reeling the printing ribbon back and forth; and printing mechanism coactive with the printing ribbon between the spools to make inked impressions; the combination of an ink-conveyor ribbon which interwinds face to face with the printing ribbon on the feed spools and is withheld from impressing action of the printing mechanism thereon; a pulley driven by said conveyor ribbon at a point between the feed spools; an upright and non-absorptive roller positively rotatively driven from said pulley in opposite directions in accordance with the direction of reeling of the ribbons; means for maintaining a supply of ink at the lower part of said roller; stationary means extending along said roller and coactive therewith during rotation of the roller in either direction to force a film of ink from said supply up the periphery of the roller; and a reversely rotative and non-absorptive ink transfer device contacting with its periphery the periphery of said roller at the upper part of the roller and also contacting with its periphery one face of said ink-conveyor ribbon at a point on said ribbon between the feed spools, said ink transfer device being positively rotatively driven from said pulley in opposite directions in accordance with the direction of reeling of the ribbons.

4. A printing machine having printing means; an ink holding reservoir; and means for automatically supplying ink from said reservoir for inking impressions during impression forming operations of said printing means, said ink supplying means comprising a ribbon fed back and forth, a single upstanding roller turned about its axis by feed movement of said ribbon and in directions varying with the direction of feed of said ribbon, a stationary member extending along and close to said roller, said roller and member extending down into the ink reservoir, and non-absorptive means for transferring ink lifted from said reservoir from the upper part

of said roller to said ribbon, said roller and stationary member being non-absorptive of ink and being coactive upon rotation of the roller in either direction to force a film of ink up the periphery of said roller from a supply of ink held in said reservoir in communication with the lower parts of said roller and stationary member.

wheel, tube and roller all being non-absorptive of ink.

10. A printing machine as claimed in claim 9, characterized in that the transfer wheel is spring urged against both the conveyor ribbon and the roller.

11. A printing machine as claimed in claim 9, characterized in that the conveyor ribbon is backed by a pulley where said ribbon is contacted by the transfer wheel, and both the transfer wheel and the roller are positively rotatively driven from said pulley.

12. A printing machine as claimed in claim 9, characterized in that the transfer wheel has a thin periphery and is spring urged against the roller and the conveyor ribbon; and also characterized in that the conveyor ribbon is backed by a pulley where said ribbon is contacted by the transfer wheel, which pulley is geared to the transfer wheel and the roller to positively drive the wheel and roller.

13. In a printing machine, means for supplying ink for type impressions comprising an ink reservoir; an upstanding and non-absorptive roller extending down into said reservoir substantially to the bottom of the reservoir; a stationary and non-absorptive tube closely and completely encircling the periphery of said roller and depending into said reservoir substantially to the bottom of the reservoir; said tube being in open communication at its lower end with the interior of said reservoir; a non-absorptive and substantially horizontally disposed ink transfer wheel supported for rotation in peripheral contact with said roller above the reservoir; and a ribbon fed horizontally past said wheel with one face of said ribbon in contact with the periphery of the wheel.

14. In a printing machine, means for supplying ink for type impressions comprising an ink reservoir; an upstanding and non-absorptive roller extending down into said reservoir substantially to the bottom of the reservoir; a stationary and non-absorptive tube closely and completely encircling the periphery of said roller and depending into said reservoir substantially to the bottom of the reservoir; said tube being in open communication at its lower end with the interior of said reservoir; a non-absorptive and substantially horizontally disposed ink transfer wheel supported for rotation in peripheral contact with said roller above the reservoir; a ribbon fed horizontally past said wheel and yieldingly engaged on one of its faces by the periphery of said wheel; a pulley opposite said wheel driven by said ribbon, and between which pulley and wheel the ribbon passes at its point of contact with the wheel; and means for rotatively driving the wheel and roller from said pulley.

15. In a printing machine, means for supplying ink for type impressions comprising an ink reservoir; an upstanding and non-absorptive roller extending down into said reservoir substantially to the bottom of the reservoir; a stationary and non-absorptive tube closely and completely encircling the periphery of said roller and depending into said reservoir substantially to the bottom of the reservoir; said tube being in open communication at its lower end with the interior of said reservoir; a non-absorptive and substantially horizontally disposed ink transfer wheel supported for rotation in peripheral contact with said roller above the reservoir; a ribbon fed horizontally past said

5 of said roller to said ribbon, said roller and stationary member being non-absorptive of ink and being coactive upon rotation of the roller in either direction to force a film of ink up the periphery of said roller from a supply of ink held in said reservoir in communication with the lower parts of said roller and stationary member.

10 5. A printing machine having a printing ribbon; printing mechanism coactive with said printing ribbon to form inked impressions; a pair of ribbon feed spools upon which the printing ribbon is reeled alternately; an ink holding reservoir; a non-absorptive ink transfer wheel rotative in opposite directions in a plane above the maximum level of an ink supply holdable by said reservoir; a single ink-lifting rotor rotative in opposite directions about an upstanding axis with its lower end extending substantially to the bottom of said reservoir and with its periphery engaged adjacent its upper end by the periphery of said ink transfer wheel; a stationary member extending along and close to said rotor substantially from the bottom of said reservoir to said transfer wheel; said rotor and stationary member being non-absorptive of ink; and an ink conveyor ribbon which interwinds face to face with the printing ribbon on the respective ribbon spools and is fed in face contact with the periphery of said transfer wheel and transversely of the axis of said wheel at a point between the feed spools, said conveyor ribbon being constantly withheld from the printing mechanism.

6. A printing machine as claimed in claim 5, characterized in that the ink conveyor ribbon is non-absorptive of ink and impervious by ink, and the printing ribbon is capable of absorbing ink conveyed on the conveyor ribbon when the ribbons are interwound face to face.

7. A printing machine as claimed in claim 5, characterized in that the conveyor ribbon drives a pulley which is geared to said ink transfer wheel and rotor for positively rotating the wheel and rotor from the pulley in a direction which changes with the direction of reeling of the ribbons.

8. A printing machine as claimed in claim 5, characterized in that the stationary member is a tube completely and closely encircling the periphery of the rotor, which tube is open at its lower end for entrance of ink held in the reservoir.

9. A printing machine having a printing ribbon; a pair of ribbon feed spools alternately upon which the printing ribbon is reeled; a non-absorptive ink conveyor ribbon which interwinds face to face with the printing ribbon upon the spools; printing mechanism active solely upon the printing ribbon in the forming of impressions; an ink reservoir; a single upstanding roller depending within the reservoir substantially to the bottom of the reservoir; a stationary tube depending within said reservoir and completely encircling the periphery of said roller substantially from end to end of the roller and in open communication at its lower end with the interior of the reservoir; and a substantially horizontally disposed ink transfer wheel whose periphery contacts one face of said conveyor ribbon at a point between the spools and also contacts the periphery of said roller adjacent the upper end of the roller; said conveyor ribbon being fed substantially horizontally past said wheel; and said conveyor ribbon,

5 wheel and yieldingly engaged on one of its faces by the periphery of said wheel; a pulley opposite said wheel driven by said ribbon and between which pulley and wheel the ribbon passes at its point of contact with the wheel; and means for rotatively driving the wheel and roller from the pulley; said wheel having a thin peripheral edge.

16. In a printing machine, means for supplying ink for type impressions comprising an ink reservoir; an upstanding and non-absorptive roller extending down into said reservoir substantially to the bottom of the reservoir; a stationary and non-absorptive tube closely and completely encircling the periphery of said roller and depending into said reservoir substantially to the bottom of the reservoir; said tube being in open communication at its lower end with the interior of said reservoir; a non-absorptive and substantially horizontally disposed ink transfer wheel supported for rotation in peripheral contact with said roller above the reservoir; a ribbon fed horizontally past said wheel and yieldingly engaged on one of its faces by the periphery of said wheel; a pulley opposite said wheel driven by said ribbon and between which pulley and wheel the ribbon passes at its point of contact with the wheel; and means for rotatively driving the wheel and roller from the pulley; said wheel having its periphery beveled downward and outward substantially to a knife edge.

17. A ribbon inking device comprising a pulley; a ribbon inking wheel yieldingly opposed to said pulley; said pulley and wheel being each supported to rotate in a substantially horizontal plane to contact with their peripheries a ribbon fed between the pulley and wheel to drive the pulley and be inked by the wheel; an ink reservoir; and a rotary pump driven from said pulley and having a single upstanding rotor extending downward from the periphery of said wheel into said reservoir and a cylindrical stator open at its lower end and surrounding said rotor; the periphery of said wheel contacting said pump rotor adjacent the upper end of the stator and rotor of the pump; and said wheel, rotor, and stator all being non-absorptive of ink.

18. A ribbon inking device comprising an ink reservoir; a non-absorptive vertically disposed tube extending down into said reservoir; a non-absorptive vertically disposed roller rotative in said tube; driving means for said rotative roller operable by movement of a ribbon transversely of the roller; and a non-absorptive rotary member peripherally engaging said roller above the reservoir for transferring ink from said roller to a ribbon actuating said driving means.

19. A ribbon inking device comprising an ink reservoir; a rotary and non-absorptive device supported to rotate in a substantially horizontal plane for applying ink to a ribbon fed past the device; a single and vertically disposed non-absorptive roller in peripheral contact with said device and extending downward from said device into the ink holding chamber of the reservoir substantially to the bottom of the reservoir; and a single stationary and non-absorptive member entirely encircling the periphery of said roller and fitting closely thereabout substantially from the lower end of the roller to the point of contact of the roller and ink applying device.

20. A ribbon inking device comprising an ink reservoir; a rotary and non-absorptive device supported to rotate in a substantially horizontal

plane for applying ink to a ribbon fed past the device; a single and vertically disposed non-absorptive roller in peripheral contact with said device and extending downward from said device into the ink holding chamber of the reservoir substantially to the bottom of the reservoir; and a stationary and non-absorptive member extending along and closely adjacent said roller substantially from said rotary device to the bottom of the reservoir.

21. A ribbon inking device comprising an ink reservoir; non-absorptive means for lifting ink from said reservoir comprising a vertically disposed and non-absorptive pump rotor turning in a non-absorptive pump stator; means for rotatively driving said pump rotor adapted to be driven by a ribbon to be inked; and a non-absorptive rotary element supported to yieldingly engage both said pump rotor and a ribbon driving said last-mentioned means for transferring lifted ink from said rotor to said ribbon.

22. A ribbon inking device comprising an ink reservoir, a tube of non-absorptive material extending down into said reservoir and in communication at its lower end with the interior of the reservoir, a single non-absorptive roller extending through said tube and entirely and closely encircled by the tube substantially from end to end of the roller, a pulley, and a rotary device for applying ink to a ribbon, said roller and device and pulley being rotatively supported to turn about substantially upright axes with the periphery of the rotary device yieldingly urged against the periphery of the roller adjacent the upper end of the roller and also yieldingly urged to the pulley to yieldingly contact a ribbon fed between the pulley and device for inking.

23. A ribbon inking device comprising an ink reservoir, a non-absorptive upright tubular pump stator extending down into said reservoir and in communication adjacent its lower end with the interior of the reservoir, a single and non-absorptive pump rotor supported to turn in said stator about an upstanding axis, a rotary ink transfer device for transferring ink from the upper end of the rotor to a ribbon to be inked, said ink transfer device being supported to turn in peripheral contact with said rotor, a pulley supported for driving by the ribbon to which ink is to be transferred by said transfer device, and means for rotatively driving said transfer device and rotor from said pulley.

24. A ribbon inking device, as claimed in claim 23, having guiding means for the ribbon to be inked, said guiding means and the pulley being supported for feeding of the ribbon over the pulley with the ribbon hugging the periphery of the pulley about the major portion of the circumference of the pulley.

25. A ribbon inking device, as claimed in claim 22, having means for rotatively driving the roller and the ink applying device from the pulley.

26. A ribbon inking device comprising an ink reservoir, a single upstanding and non-absorptive rotor extending down into said reservoir substantially to the bottom of the reservoir, a stationary non-absorptive member extending along said rotor closely adjacent to the periphery of the rotor substantially from end to end of said rotor, and a rotary ribbon inker adjacent the upper end of said rotor supported

to rotate with its periphery contacting that of the rotor adjacent the upper end of the rotor.

27. A ribbon inking device, as claimed in claim 26, having a pulley, means for guiding over said pulley a ribbon to be inked, and means for rotatively driving said rotary ribbon inker and said rotor from said pulley, said guiding means being arranged to cause the ribbon to hug the periphery of the pulley around the major portion of the circumference of the pulley, and said rotary inker being supported to yieldingly engage the rotor and to yieldingly engage the ribbon at a point where the ribbon is backed by the pulley.

28. A printing machine having, in combination, type impression forming means, an impression inking ribbon fed back and forth for impression inking action thereon by the impression forming means at an impression forming point, an ink reservoir, a single non-absorptive rotor extending downward into said reservoir and supported for rotation about an up-standing axis, stationary non-absorptive means extending along and close to said rotor and coactive therewith during rotation of the rotor to advance a film of ink up the rotor from a supply in the reservoir, a rotary ink transfer device supported opposite the upper end portion of the rotor having its periphery contacting the periphery of the said end portion of the roller, and an ink conveyor ribbon fed back and forth to take ink from the periphery of said transfer device during feeding of the impression inking ribbon in each direction and convey the ink to that portion of the impression inking ribbon which is being fed away from the impression forming point.

29. A printing machine, as claimed in claim 28, wherein the ribbons are fed by a reversible feed mechanism common to both ribbons and travel in face contact at both sides of the impression forming point.

30. A printing machine, as claimed in claim 28, wherein said rotary ink transfer device is non-absorptive of ink.

31. A printing machine, as claimed in claim 28, wherein both said ink transfer device and said ink conveyor ribbon are non-absorptive of ink and the face of the ink conveyor ribbon which takes ink from said device is fed into contact with a face of the impression inking ribbon at both sides of the impression forming point.

32. A printing machine, as claimed in claim 28, wherein said stationary means is an up-standing tube closely surrounding the rotor and in communication adjacent its lower end with the interior of the reservoir.

33. A printing machine, as claimed in claim 28, wherein said ink transfer device and rotor are rotatively driven from a pulley driven by the ink conveyor ribbon, which ribbon is backed by the pulley where it is engaged by the ink transfer device.

34. A printing machine, as claimed in claim 28, wherein the ink transfer device turns about a floating axis and is resiliently pressed to the ink conveyor ribbon and the rotor.

35. A printing machine, as claimed in claim

28, wherein the ink conveyor ribbon drives a pulley which backs said ribbon at the point of ink transfer thereto, said ribbon passing between said pulley and the ink transfer device, and said device and the rotor are rotatively driven from said pulley.

36. A printing machine, as claimed in claim 28, wherein the ink conveyor ribbon and ink transfer device are non-absorptive of ink, and said ribbon travels over a pulley the periphery of which it is guided to hug around the major portion of the circumference of the pulley, and means are provided for rotatively driving the ink transfer device and the rotor from said pulley.

37. A printing machine having, in combination, type impression forming means, an absorptive impression inking ribbon fed back and forth across an impression forming point for expulsion of ink therefrom by the type to ink the type impressions, an ink reservoir, a non-absorptive upright and stationary tube extending down into said reservoir and in open communication with the interior of the reservoir adjacent the bottom of the reservoir, a single non-absorptive and upright ink-lifting roller extending through said tube and closely surrounded thereby, a non-absorptive and rotary ink transfer device located adjacent the upper end of said roller with its periphery contacting that of the roller to take ink therefrom, and a non-absorptive ink-conveyor ribbon fed back and forth to take up ink from the periphery of said device and convey it, during feeding of the impression inking ribbon in each direction, to a face of that portion of the impression inking ribbon which is being fed away from the impression forming point.

38. A printing machine, as claimed in claim 37, having a pulley which is located opposite the ink transfer device and back of the ink conveyor ribbon opposite the point of contact of said device with the ribbon, driving means for rotatively driving the ink transfer device and the roller from said pulley, and means for guiding the ink conveyor ribbon to hug the periphery of said pulley around the major portion of the circumference of the pulley.

39. A printing machine having, in combination, type impression forming means, an absorptive ribbon fed back and forth across an impression forming point for expulsion of ink therefrom by the type to ink the type impressions, a non-absorptive inker wheel, a non-absorptive ink conveyor ribbon fed back and forth to take ink from the periphery of said wheel during feeding of the absorptive ribbon in each direction and carry the ink to a face of that portion of the absorptive ribbon which is being fed away from the impression forming point, said wheel being yieldingly held to the non-absorptive ribbon and supported to yield bodily transversely of its axis, the wheel axis extending widthwise of the non-absorptive ribbon, an ink reservoir below the level of the wheel, and non-absorptive means for feeding a film of ink upward from the reservoir to the periphery of the wheel during feeding of the two ribbons.

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