

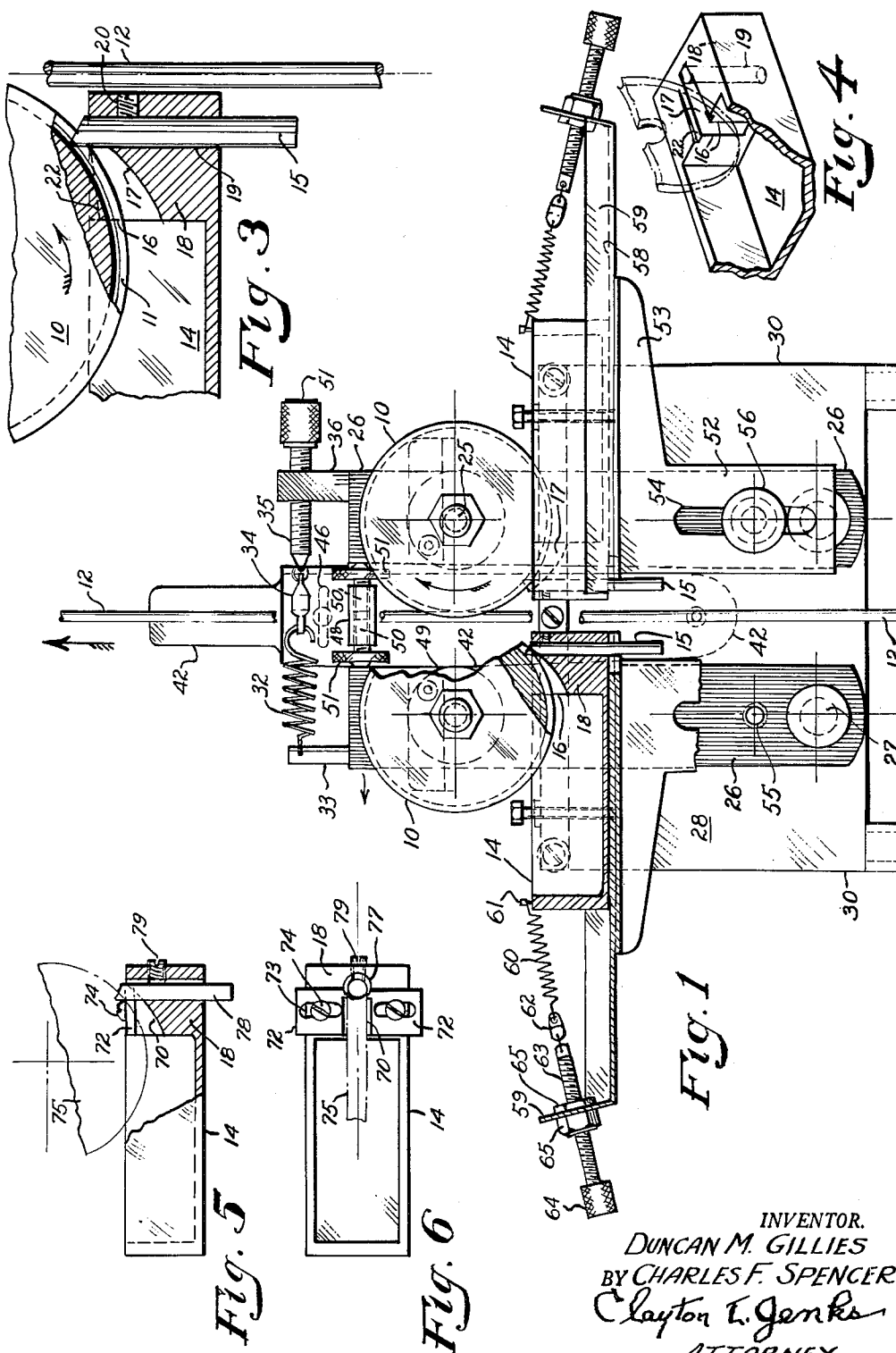
Dec. 28, 1965

D. M. GILLIES ETAL
APPARATUS FOR PRINTING A SERIES OF
INDICIA ON AN ELONGATED WORKPIECE

3,225,688

Filed June 8, 1964

2 Sheets-Sheet 1



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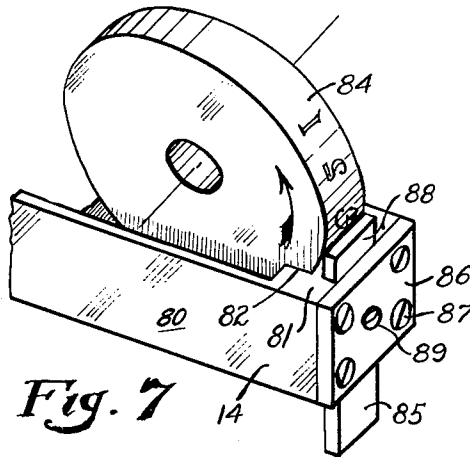
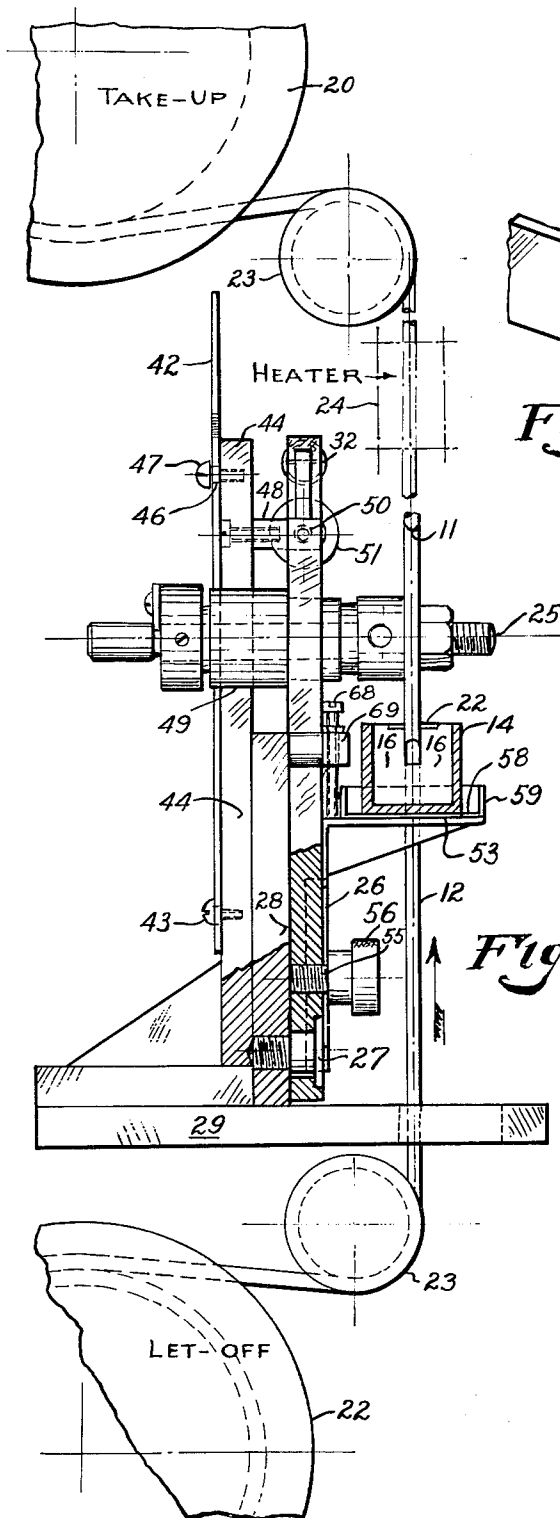


Fig. 2

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APPARATUS FOR PRINTING A SERIES OF INDICIA ON AN ELONGATED WORKPIECE

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3 Claims. (Cl. 101—36)

This invention relates to apparatus for printing a series of indicia on an elongated workpiece.

Coated wire and other elongated cylindrical bodies have been printed or marked by means of engravings on concave wheels in accordance with our prior Patents 2,898,848 and 2,898,849 of August 11, 1959. In those constructions, a coated wire is passed vertically between the two engraved wheels and ink is applied to the engravings by means of ink pots within which portions of the wheels revolve. Doctor wipers serve to remove the excess ink from the grooves and sides of the wheels and return the ink to the pots. We have found that our prior construction, which requires a downward movement of the coated wire, does not give adequate time for drying the printed wire before it has to be mounted on a reel or other storage device.

The primary object of our invention is to provide a printing apparatus of this general type which is so constructed that an elongated workpiece may be passed upwardly between the engraving wheels into a space thereabove which provides adequate drying time for the ink before it contacts with the work or reeling mechanism.

Another object is to provide apparatus of this type which is so constructed that the engraving wheels may rotate in and be inked by means of ink in pots therebeneath, and wherein the doctor wipers are so arranged as to return the excess ink to the pots and prevent smearing the work passing upwardly between the wheels.

In accordance with our invention, we have provided apparatus for printing a series of indicia on an extended work piece, such as a wire coated with rubber, plastic or other suitable material, which is moved upwardly through the printing zone. One form of our apparatus may be of the general type shown in our prior patents which comprises a pair of opposed wheels having peripheral grooves provided with intaglio engravings and shaped to interfit with a work piece therebetween and which are associated with driving mechanism arranged for moving the workpiece upwardly between the wheels and wherein ink is supplied to the wheel peripheries by means of separate inking pots beneath the wheels and the excess ink is removed by means of a cylindrical doctor in the groove and doctor wipers providing scraping edges engaging the upwardly revolving portions of the wheels, and wherein the doctors are so arranged as to engage the upwardly moving portions of the wheels before the latter engages the work piece, and which further includes resilient means for urging one doctor into wiping contact with the wheel periphery. Other features will be explained below.

Referring to the drawings illustrating preferred embodiments of this invention:

FIG. 1 is an elevation, partly in section, of a printer having a concave wheel arranged to print an upwardly moving work piece;

FIG. 2 is an elevation thereof, showing the work supply reels diagrammatically;

FIG. 3 is a fragmentary sectional detail of the doctor wheel wiping structure;

FIG. 4 is a fragmentary perspective view showing the doctor wipers for the wheel sides;

FIGS. 5 and 6 are respectively a vertical section and a plan view of a pot having adjustable scraper blades for

cleaning the wheel sides and a cylindrical doctor mounted for adjustment towards the wheel periphery; and

FIG. 7 is a fragmentary perspective view of a non-grooved cylindrical wheel and a flat surfaced doctor strip for cleaning the wheel periphery.

The preferred embodiment of this invention illustrated in the drawings comprises two engraving wheels 10 having peripheral concave grooves 11 shaped to interfit with the outer cylindrical surface of coated wire or other long work piece 12. The flat side faces of each wheel meet the concave groove at sharp ridges, so that the excess ink may be satisfactorily removed from the wheel faces and groove. The wheel groove is provided with a desired intaglio engraving which is inked by means of an ink pot 14 mounted beneath the wheel and so arranged that the wheel dips into the ink. An adjustably mounted cylindrical doctor 15 made of nylon, Teflon, or other suitable wiping material has its end shaped to fit in the wheel groove to wipe the excess ink therefrom, it being so mounted that the excess ink is returned to the pot beneath the wheel. Doctors are arranged to provide sharp edges engaging the sides of the up traveling portion of each wheel to scrape excess ink from the wheel sides. In the form shown in FIGS. 3 and 4, these side doctors or wipers are formed by the forward edges 16 of a vertical groove 17 milled in the wide wall portion 18 of the ink pot. The groove has such a width that its sides fit against the wheel.

Means are provided whereby the cylindrical doctor 15 is resiliently urged into a wiping contact with the groove of its associated wheel while the scrapers for the wheel sides are maintained in adequate contact to remove the excess ink from the wheel sides. Of the various mounts which may be employed for holding the doctors in contact with the upwardly traveling portion of the wheel, we prefer that the doctor structures be mounted directly on the ink pot itself and that the latter be urged by a spring to move in such a direction as to hold the cylindrical doctor firmly against the wheel groove. To this end, the ink pot 14 is made as a hollow metal casting arranged with its thickened end wall 18 located adjacent the work piece. This wall 18 is provided with a vertical or upwardly directed hole 19 (FIG. 3) within which the cylindrical doctor 15 is slidably mounted and held in an adjusted position by a set screw 20.

Mechanism is provided for moving the work piece upwardly past the wheels 10, and this is shown diagrammatically in FIG. 2 as comprising a power driven take up reel 20 or other suitable device for drawing the work piece upwardly from a supply reel 22 suitably located for the purpose. Suitable sheaves 23 and other devices may be employed for directing the coated wire in its upward movement from one reel to another. The upward movement of the work also makes it possible to insert an electric heater 24 above the printer for drying the ink before it has to contact with a sheave or reel. There is not adequate space beneath the work bench for a drier to treat a downwardly moving wire.

The slot or groove 17 has such a width that the side walls thereof make a sliding contact with the wheel faces, and the forward edges 16 formed by the sides of the slot and the vertical inner surface of the wall 18 provides a scraping edge of a satisfactory sharpness or shape to remove the excess ink from the side of the wheel. Since a different size of pot is best provided for each wheel size, then the slot 17 in the wall 18 is suitably milled to fit with each wheel. It will also be observed that the top face of the wall 18 is milled to provide a downwardly sloping trough 22 which directs the excess ink scraped from the groove and wheel faces back towards the pot for reuse.

The engraving wheels are suitably mounted on horizontal axes 25 arranged on opposite sides of the work piece 12 and preferably with the axis of each axle in a horizontal plane. Each axle 25 may be suitably mounted in bearings in a rocking standard 26 pivoted on a pivot pin 27 mounted in the upright 28 carried by the base 29 of the apparatus. Each wheel periphery is urged into contact with the coated wire 12 by means of a spring 32 connected at one side to a post 33 projecting upwardly from the left hand rocking standard 26, and at its other side to a swivel 34 mounted on the end of a screw 35 which is adjustably threaded through an arm 36 projecting upwardly from the other rocking standard 26.

The wheels, which may be mounted as shown in our Patent 2,898,848, may be rocked away from each other against the action of the spring 32 by means of a vertical lever 42 (FIG. 2) pivoted on a screw 43 carried by a vertical extension 44 of the frame member 28. This lever 42 has a slot 46 (FIG. 1) through which projects a screw 47 fixed in the upright standard 44. The vertical edge of this lever 42 rests against the left hand bearing housing 49 which carries the wheel axle 25. By rocking that lever toward the left (FIG. 1) the housing and its supporting rocking standard 26 are moved toward the left and thus serves to remove the associated wheel from the work piece. If desired the right hand wheel standard 26 may be rocked manually toward the right.

The wheels are replaceably mounted on their axes so that different size wheels may be employed in accordance with the diameter of the coated wire being printed, and the various adjustments in the apparatus are primarily to adjust for accommodation of wheel and wire sizes. An adjustable stop prevents the wheels from contacting and injuring each other if there is no wire located therebetween. This comprises two screws 50 threaded into the block 48 mounted on the side of the standard 44. The screws have knurled heads 51 engaging the rocking standards 26. By adjusting the knurled heads and their screws 50, the rocking standards are limited in their movements and the wheels are held out of contact. Various other features may be incorporated in the apparatus in accordance with our prior patents.

A primary feature of this invention, as above-explained, comprises the association of a doctor wiper for the wheel periphery and wipers for the wheel sides which are so arranged relative to the printing wheels as to remove the excess ink from the up moving portion of the wheel just prior to its contact with the work piece. Since these doctors are mounted on the ink pot, it is necessary to urge the ink pot in such a direction as to bring the wheel periphery doctor into firm contact with the wheel. For the different diameters of wire or other work piece to be printed, it is necessary that the wheel groove have substantially the same diameter as the work, and this may require a different diameter of wheel. We have found it desirable to provide different ink pots for the different wheel structures and to have the various doctors sized according to the requirements of the wheel. Also, it is necessary to have the ink pot adjustable vertically to accommodate the wheel size. To these various ends, each ink pot 14 is removably mounted on an L-shaped support formed of the vertical part 52 and a horizontal shelf 53. The part 52 has an elongated slot 54 within which rides a bolt 55 threaded into the swinging wheel support 26, and having an enlarged head 56 arranged to be clamped against the outer side of the support 52 and draw the latter tightly against the rocking arm 26.

The top of the shelf 53 carries a trough like member comprising a bottom 58 and sides 59 within which the ink pot 14 is slidably mounted. A spring 60 is connected at one end to a peg 61 on the adjacent wall of the pot and at its other end is connected through a swivel 62 with a screw 63 threaded in the end wall 59 of the trough. This screw is adjusted to tighten the spring 60 by means of a knurled head 64 and held in that adjusted position by

lock nuts 65. By this means the pot is slid on the shell and the cylindrical doctor 15 is drawn forward into a firm wiping contact with the wheel periphery. To prevent the pot and its supporting shelf from being raised too far into a damaging contact with the wheel, a screw threaded stop 68 (FIG. 2) is threaded through an arm 69 projecting from the vertical standard 28, and that screw is so located and adjusted that it will strike the top of the shelf and limit its upward movement.

In FIGURES 5 and 6, we have shown a structure which provides for adjusting the doctors into proper association with different sized wheels. Although the various doctors may be mounted on the frame structure apart from the pot, it is preferred that the latter be the doctor's support. In this structure, the slot 70 is made wide enough and deep enough to satisfy the requirements for various wheel diameters and widths. The wheel side doctors are separate blades movably mounted on the top of the pot. In this structure, each blade 72 is a thin flat steel piece 72 provided with a slot 73 and mounted beneath the head of the screw 74 in the slot which is suitably threaded into the top 18 of the pot. These two blades 72 may be adjusted into wiping contact with the outer faces of the wheels 75 and then fixed in position by means of the set screws 74. The inner end surfaces of these blades are suitably shaped and preferably provided with sharp corners or edges so as to give a good wiping or scraping contact with the parallel side face of the wheel.

It is also feasible to employ periphery doctors of different diameters which will fit the various sizes of wheel grooves according to the diameter of the workpiece. Hence the hole 77 in the end 18 of the pot, which corresponds with the hole 19 of FIG. 3, is made oversize, and a replaceable cylindrical doctor 78 of suitable composition is loosely mounted in that hole. A set screw 79, corresponding with the set screw 20 of FIG. 3, will crowd the doctor into proper wiping contact with the groove of the wheel periphery, it being understood that the wheel groove and the doctor have the same radius. Hence, the construction of FIGS. 5 and 6 provides for replacement and adjustment for the two types of doctor as required by wheels of different thicknesses and groove sizes.

It is often required to print flat pieces or other shapes of work in which a wheel having a cylindrical periphery is employed for the engraving. That is, a simple structure, shown in FIG. 7, may comprise an inkpot 80 similar to the pot 14 of FIGS. 3 and 4 in which the wide end wall 81 is provided with a slot 82 similar to the slot 17 which has such dimensions that it provides wiping contact with the sides of the wheel as above-explained relative to FIGS. 3 and 4. The peripheral face 84 of the wheel may be wiped by a flat plastic wiper strip 85 which is suitably shaped and mounted to engage the upwardly moving portion of the wheel and remove the excess ink therefrom. This strip 85 is mounted in a hole corresponding with the hole 19 (FIG. 3) which is formed by means of an end plate 86 held by means of the screws 87 against the outer end wall 88 of the pot. The wiper 85 may thus be adjusted longitudinally of the supporting hole and then held firmly in position by means of the screws 89 of the end plate.

It will now be appreciated that we have provided an apparatus having two wheels, the periphery of one of which carries an intaglio engraving for marking a series of like indicia on an extended work piece of indefinite length. The wheels are freely rotatable and are held in firm contact with the work piece, preferably by means of a spring. The work piece is drawn upwardly from a let-off reel by means of a take-up reel and driving mechanism of suitable construction having adequate speed regulating features which insure moving the work piece at a controlled rate between the wheels. The work piece passes through a drying zone before it contacts with a sheave or reel. This drying zone, depending on the requirements of the printing ink, may be provided by hav-

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ing an extended portion of the work above the printer be held in a drying atmosphere for a sufficient time before it contacts with any portion of the driven reel or guiding sheaves. If there is not adequate space for this drying operation, we may employ a heater of suitable construction and preferably one which is heated by an electrical resistance coil or a heated air derived from a suitable source. The wheels have the excess of ink removed from the periphery and wheel sides by means of doctors engaging both the periphery and the sides. The preferred doctor construction is preferably provided by milling a slot in a thick end wall of the ink pot within which the wheel dips, and the slot is preferably sized and arranged to scrape against the sides of the wheel and thus form the side doctors. The upwardly moving portion of the wheel periphery is freed from excess ink by means of a doctor of a configuration corresponding with that of the periphery, and it is preferably mounted in a hole in a thick end wall of the pot where it is adjustably held in contact with the wheel. As shown in FIGS. 5 and 6 the slot in that wall may be as wide as the widest wheel to be used, and the side wipers in that case are separately adjustable scraper blades held in contact with the opposite sides of the wheel. Likewise, the doctor engaging the wheel periphery may be much smaller than the upwardly extending opening in the end wall and be there held in contact with the wheel by an adjustment screw in that wall. If the wheel has a cylindrical and non-grooved periphery, the doctor blade may be a flat strip held adjustably positioned in a hole in the end wall, which, in this case, is formed by providing the end wall with a groove covered by an end plate. Various other features are set forth above.

It will therefore be appreciated that this structure as above described may be suitably modified to provide for different shapes of wheel periphery and its marking surface. Also various modifications may be made in this structure within the scope of the claims; hence, the above disclosure is to be interpreted, not as imposing limitations on the claims, but as setting forth the principles of the invention and our preferred embodiments thereof.

We claim:

1. Apparatus for marking a series of indicia on a longitudinally moving workpiece of indefinite length comprising a pair of opposed wheels, the periphery of at least one of which is provided with an intaglio engraving,

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and which are peripherally shaped to mark a contacting work piece moving there between, parallel horizontal axles for said wheels arranged on opposite sides of the work piece, means for guiding and moving the work piece upwardly between and in contact with the wheel peripheries and through a drying zone above the wheels, the peripheral portions of the wheels in contact with the work piece moving upwardly therewith, two separate ink pots located beneath the wheels, said wheels dipping into the ink in the pots, a horizontal table upon which each ink pot is movably mounted, two wheel periphery wipers, a support on each pot which holds one of said wipers in operative engagement with the upwardly moving peripheral portion of the associated wheel, means for moving each pot to cause the wiper thereon to engage the wheel periphery operatively for removing excess ink therefrom, and a wheel side wiper carried by and fixed relative to the pot which removes excess ink from each wheel side irrespective of said movement of the pot.

2. Apparatus according to claim 1 in which each pot has a thick end wall adjacent to the moving work piece, said wall having an upwardly extending opening, said periphery wiper being adjustable in the opening for operatively contacting the wheel periphery, and said means for moving the pot being a resilient member mounted on the table and connected to the pot which urges the periphery wiper into firm contact with the wheel periphery.

3. Apparatus according to claim 1 in which each pot has a thick end wall adjacent to the moving work piece, said wall having a vertical slot within which the upwardly moving portion of the wheel revolves and which is sized according to the wheel thickness so that the sides of the slot form said side wipers and remove excess ink from the wheel sides.

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