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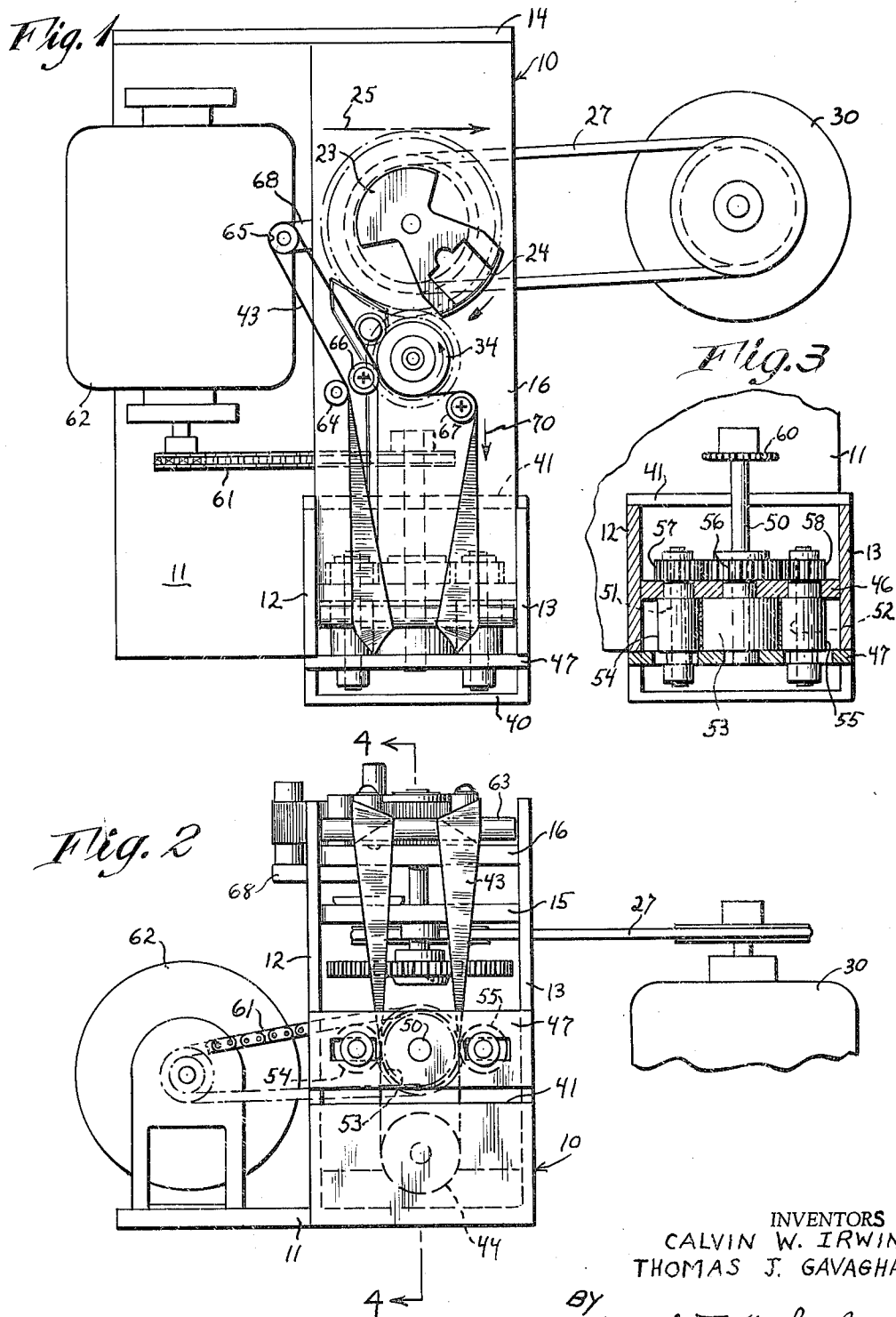
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INK APPLICATOR FORMED OF AN ENDLESS STRAND

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2 Sheets-Sheet 1



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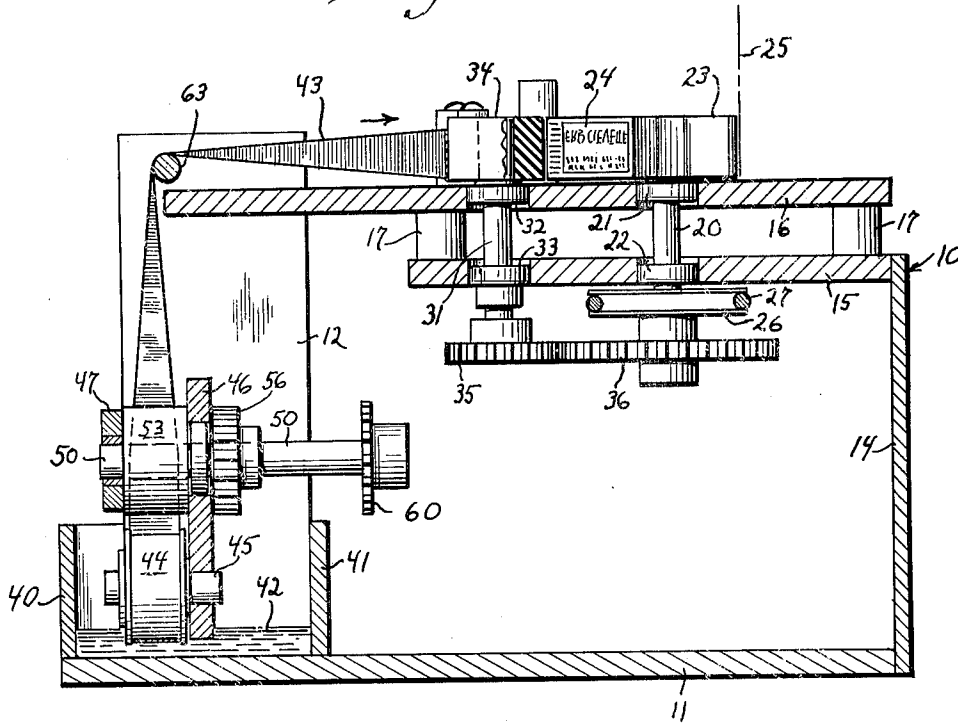
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Fig. 4



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INK APPLICATOR FORMED OF AN ENDLESS STRAND

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This invention relates to a novel apparatus for delivering ink to a printing die. More particularly the invention relates to an improved apparatus for transporting ink from a source of supply to a rapidly moving printing die and for progressively applying a uniform film of ink over the operative surface of said die.

There are many data processing installations in which large numbers of separate printing operations have to be completed in a relatively short period of time. One example of this type of printing operation is in high speed check handling machines where each of a large number of checks after being transported past a reading head must be individually endorsed with the name of a bank or other endorser. In such machines documents may be processed at rates up to 1500 per minute and higher and thus require a correspondingly high printing rate. In most cases a rotary printing die is used in such machines, the die being inked just prior to each cyclic rotary printing stroke. Several problems have presented themselves in connection with the inking of high speed rotary type dies; for example when the thickness of the film of ink cyclically deposited on the die becomes relatively large a portion of the ink will be centrifugally thrown off the rotating die to the obvious detriment of any adjacent documents and the surrounding portions of the machine. Another difficulty which has been encountered here is that variations occur in the amount of ink applied to different surface portions of the die during each inking operation. This difficulty can cause wide variations in the intensity of print between the characters recorded by one printing cycle. These two above difficulties are particularly prevalent where felt type rollers are used to supply the ink to the operative surfaces of the rapidly moving die.

One object of the present invention is to provide an improved inking arrangement for a rotary printing die whereby a uniform thin layer of ink is cyclically applied to the operative surfaces of said die.

Another object of the invention is to provide an inking device whereby a porous type ink carrying element or web engages a portion of the periphery of a rotating ink receiving member so that the periphery of said member by a wiping action against said element takes on a uniformly thin layer of ink.

Another object of the invention is to provide an inking device for a high speed rotary die whereby at any given time only a relatively small amount of ink is moving at a high rate of speed.

A further object of the invention is to provide a novel inking device wherein an elongated ink carrying element or strand extends from an ink reservoir to a peripheral portion of an ink transfer roll, there being a large speed differential between said roll periphery and said strand whereby said roll continually wipes off a thin uniform layer of ink from said strand.

Still another object of the invention is to provide a novel inking device wherein a relatively slow moving flexible ribbon is used to transport ink to the periphery of a relatively fast moving ink transfer roll, the ribbon being subjected to an initial squeezing pressure so that the thickness of the amount of ink subsequently applied to said roll may be controlled.

Other objects of the invention will become apparent as the disclosure progresses.

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In the drawings:

FIG. 1 is a plan view of one embodiment of the instant inking device.

FIG. 2 is a front elevational view of the apparatus shown in FIG. 1.

FIG. 3 is a fragmentary sectional plan view of the ribbon drive means of FIG. 1.

FIG. 4 is a partial sectional view taken along section line 4—4 of FIG. 2.

In the embodiment of the invention shown in FIGS. 1—4 there is provided a main frame 10 comprising a horizontally disposed base 11 on which is mounted three upstanding plates 12, 13 and 14, and a pair of parallel upper plates 15 and 16. The plates 15 and 16 are mutually secured to one another in fixed spaced relation by any suitable means such as spacer rivets 17, FIG. 4; the uppermost plate 16 being secured to and between the upper ends of plates 12 and 13 while plate 15 is secured to the upper end of plate 14 as is best seen in FIG. 4. A vertical shaft 20 is rotatably mounted in plates 15 and 16 by means of bearings 21 and 22, the upper end of the shaft having secured thereto a printing die 23 having an operative peripheral portion 24 that is formed so as to be capable of printing on a document that is located in the printing plane 25, FIGS. 1 and 4. Secured to the lower end of shaft 20 is a pulley 26 over which extends a belt 27 that is suitably driven as by a motor 30, FIG. 1, so as to rotate the printing die 23 at a predetermined relatively high rate of speed. Another vertical shaft 31 is rotatably mounted on plates 15 and 16 by means of bearings 32 and 33, the upper end of shaft 31 having secured thereto an ink transfer roll 34 having a rubber type peripheral surface that is dimensionally and positionally arranged so as to be capable of non-skidding rolling engagement with the printing portion 24 of the printing die 23. Fixed to the lower end of shaft 31 is a gear 35 which meshes with a gear 36 secured to said shaft 20 whereby said shafts are interconnected for timed rotation, this timed rotation being such as to produce said rolling engagement between the die portion 24 and the periphery of the ink transfer roll 34.

Secured to the lower ends of the two vertical frame plates 12 and 13 are opposed plates 40 and 41 which in conjunction with said plates 12 and 13 and the base 11 define a box-like container that is adapted to receive and hold an ink reservoir 42, FIG. 4. An endless fabric strand or ribbon 43 is provided in the instant apparatus so as to deliver ink from reservoir 42 to the said ink transfer roll 34. The support and drive means for said ribbon comprises a lower pulley 44 that is rotatably mounted on a stud shaft 45, the lower peripheral portion of the pulley being immersed in said ink reservoir. The stud 45 is fixed to a vertically disposed shaft supporting plate 46, FIG. 4, that is secured to and between the vertical frame plates 12 and 13. Fastened to the outer edges of plates 12 and 13 is a shaft supporting plate 47. Rotatably mounted in said plates 46 and 47 is a first shaft 50 and two parallel adjacent shafts 51 and 52 as is best seen in FIG. 3. A roller 53 secured to shaft 50 has a peripheral surface that is closely spaced from the corresponding surfaces of two smaller rollers 54 and 55 respectively secured to the shafts 51 and 52. The rollers 53—55 are adapted to be driven in unison by means of a gear 56 which is secured to shaft 50 and which meshes with gears 57 and 58 fastened to the respective adjacent ends of shafts 51 and 52. The inner end of shaft 50 is provided with a driving sprocket 60 over which operatively extends a chain 61 that is adapted to be suitably driven at a relatively slow speed by a motor 62 mounted on the main frame 10. A cylindrical ribbon feed direction changing rod 63 is secured to and between the upper ends of vertical frame plates 12 and 13, and four horizontally disposed coplanar idler rollers or pulleys 64, 65, 66 and 67,

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FIG. 1, are rotatably mounted by any suitable means on the top frame plate 16 of the machine, pulley 65 being rotatably mounted on a lateral extension 68, FIG. 1, secured to the top plate 16. The ribbon 43 progressively extends around the lower portion of pulley 44 between rollers 53, 54 and 55 respectively and over pulleys 64-67. The roller 54 may be adjustably mounted so as to be positionable slightly closer or farther away from pulley 53 thereby making it possible to variably squeeze that portion of the ribbon leaving the ink reservoir and to thereby meter the amount of ink retained in the ribbon as the latter moves toward the transfer roll 34.

In operation when the rollers 53-55 are driven by motor 62 the endless looped ribbon 43 will be driven in a generally clockwise direction as indicated by arrow 70, FIG. 1; namely downwardly between the rollers 53, 55, through the ink reservoir 42, upwardly between rollers 53 and 54, over rod 63, around pulleys 64, 65, past pulley 66 and around a peripheral portion of the ink transfer roll 34, over pulley 67, down over rod 63 and finally back through rollers 53 and 55 again. The ribbon is thus circulated or advanced by motor 62 over the path just mentioned at a relatively slow speed while printing die 23 and ink transfer roll 34 are simultaneously rotated by motor 30 at a relatively high speed. In this manner ink may be continuously picked up by the ribbon as the latter passes through the ink reservoir and then slowly transported to the high speed ink transfer roll 34. The extensive amount of slippage between the movement of the ribbon 43 and the periphery of roll 34 advantageously gives rise to a continual rapid wiping action therebetween whereby the periphery of the transfer roll can pick up only a thin but continuous uniform layer of ink which may thereafter be deposited by the rolling contact of the roll 34 on the printing die surface 24. This rapid wiping action also prevents excessive amounts of ink from accumulating on the transfer roll and furthermore eliminates ghosting, i.e. it wipes out any ink patterns on the roll 34 caused by the transfer of only part of the ink therefrom to the printing die 23. The portion of the ribbon extending between pulleys 65 and 66 is disposed so as to "catch" any minute amount of ink "misting" which may occur near the point where the contacting roll and die peripheries separate. To additionally facilitate the removal of any such misting a vacuum type take away blower and associated ducts may be provided if desired.

A prototype of the instant invention has been successfully built and tested and has been found to produce an excellent print on a document that is rapidly moving along the printing plane 25. Here a typewriter ribbon was used and was found to have very little signs of wear after extensive use, the ink apparently offering an advantageous lubricating action between the ribbon fabric and the periphery of the high speed transfer roll 34. The ribbon 43 may be of various types and may be made from various materials, however in each case it will have recesses and/or be porous to the extent necessary for it to receive and retain at or near the surface thereof at least small amounts of ink that may be wiped off by the periphery of the rotating transfer roll 34.

Since many changes could be made in the embodiment of the invention as particularly described and shown herein without departing from the scope of the invention, it is intended that this embodiment be considered as exemplary and that the invention not be limited except as warranted by the following claims.

What is claimed is:

1. An inking device for a printing apparatus; comprising
 - a frame;
 - a printing die rotatably mounted on said frame;
 - an ink transfer roll rotatably mounted on said frame;

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means for rotatably driving both said die and roll at peripheral speeds corresponding to the desired printing speed, said roll and die being disposed in mutual peripheral contact;

- an ink supply means mounted on said frame;
- a plurality of pulleys rotatably mounted on said frame;
- an endless ink carrying ribbon entrained over said pulleys, said pulleys being arranged so that said ribbon extends from said ink supply means to said transfer roll and back, a portion of the ribbon being wrapped around and in contact with an arcuate portion of the periphery of said transfer roll; and
- means for driving said ribbon around said pulleys at a speed such that the linear speed of the ribbon is less than the peripheral speed of said roll whereby the periphery of said roll continuously and rapidly wipes past the contacting portion of the relatively slowly moving ribbon.

2. Apparatus as defined by claim 1; additionally comprising a pair of cooperating metering rolls rotatably mounted on said frame and adapted to squeeze said ribbon so as to limit the amount of ink retained by said ribbon after leaving said ink supply means.

3. Apparatus as defined by claim 1 wherein a portion of said ribbon is disposed adjacent to said transfer roll for gathering any ink mist which may be dispersed by said transfer roll and printing die.

4. Apparatus as defined by claim 1 wherein the axes of some of said pulleys are disposed in one plane and the axes of others of said pulleys are disposed in a plane that is positioned at an angle to the first mentioned plane.

5. An inking device: comprising
 - a frame;
 - a printing die operatively mounted on said frame;
 - an ink supply means mounted on said frame and adapted to retain a reservoir of printing ink that is to be progressively transferred to the operative surfaces of said printing die;
 - an ink transfer roll rotatably mounted on said frame and adapted to peripherally receive ink and transfer the same to said printing die;
 - an endless porous inking strand extending between said ink supply means and said transfer roll, one portion of said porous inking strand being disposed in said ink supply means and another portion of said porous inking strand continuously engaging a predetermined arcuate length of the operative inking periphery of said transfer roll whereby ink from said reservoir may be progressively picked up by and retained in the pores of said porous strand and presented to the surface of said roll;
 - means on said frame for supporting said ink strand for movement along an endless path;
 - a first drive means for driving said last mentioned means; and a second drive means for driving said ink transfer roll at a high rate of speed relative to said porous strand so that the cylindrical periphery of said transfer roll may rapidly wipe past said porous strand and thereby continuously pick up a thin film of ink that is then presented to the operative face of said printing die.

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