March 8, 1966 G. MATKOVICH ETAL 3,238,870

INKER

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Fig. 1

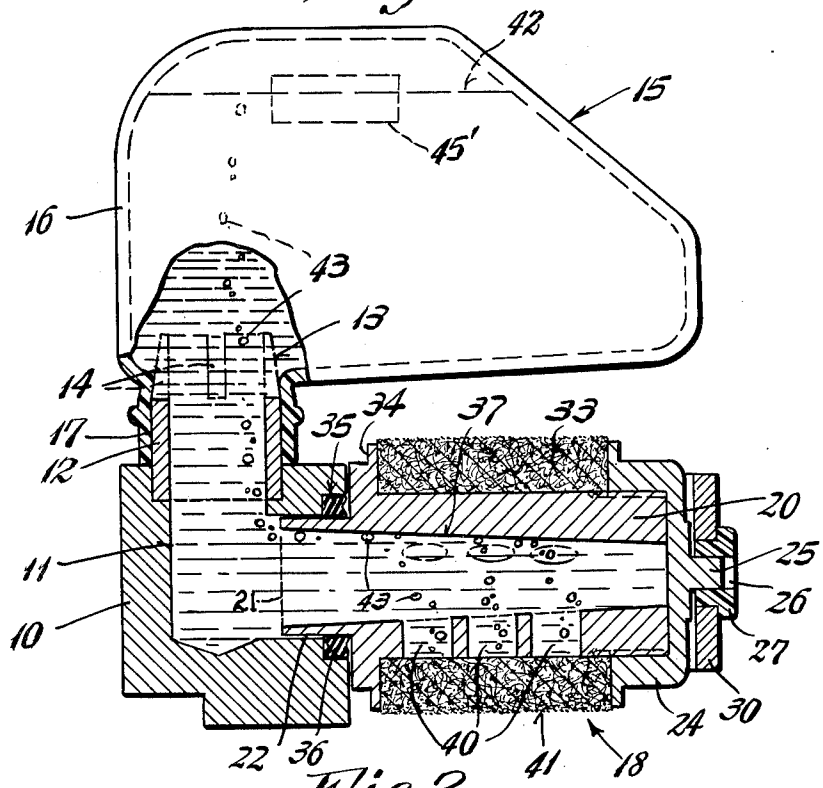
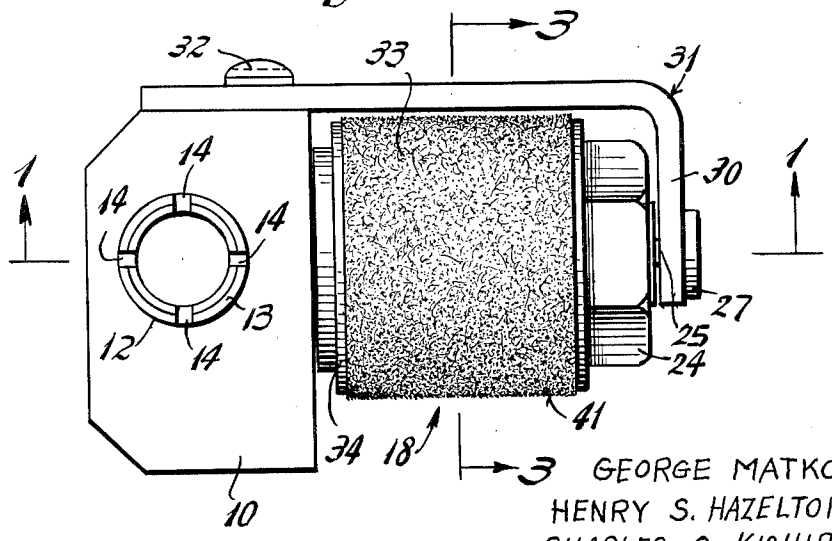


Fig. 2



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Fig. 3

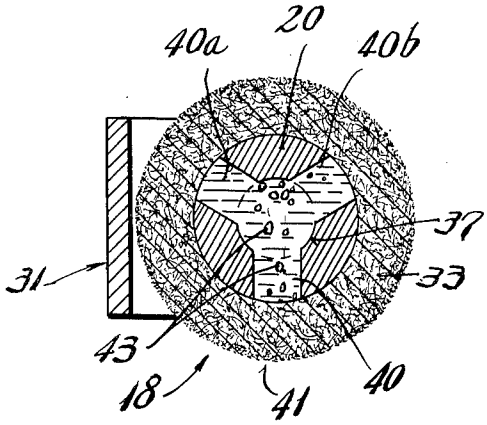


Fig. 4

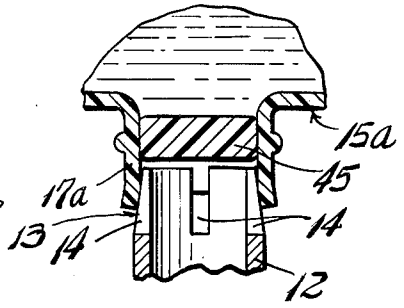


Fig. 5

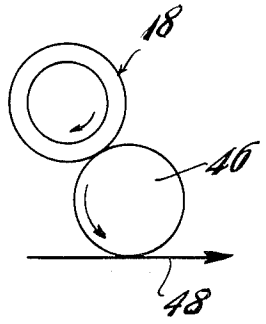
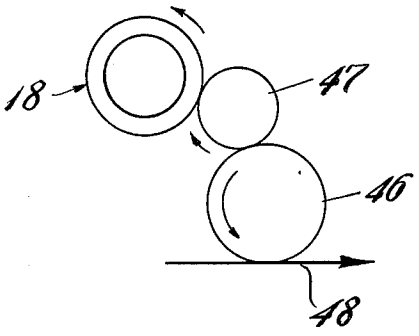


Fig. 6



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3,238,870

INKER

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2 Claims. (Cl. 101—367)

This invention relates to an improved automatic inker. More particularly the invention relates to a novel closed type of inking system having an internal inking member and an external ink supply means.

In those printing devices which are operated at random times and which must produce a high quality of print, the inking means must be ready at all times to reliably and uniformly apply a film of ink to the operative surfaces of the printing die or other printing media. To provide this capability the inking system must exhibit many exacting operational characteristics, such as the ability to efficiently operate at any time without priming and without the need for removal of dried ink from any exposed parts thereof. Further, no manual adjustment of ink metering controls should be required and of course the system must not leak. It is also desirable to provide a simple quick way to replenish the ink supply for the unit without the operator's hands becoming soiled. Many proposals have been made for inking means that meet one or more of the above requirements, however no one of these proposals has for the most part afforded an economical solution to all the functional characteristics required for a highly efficient and reliable inking unit.

One object of the instant invention is to provide a novel inking unit which will satisfy the above noted inking requirements of a printing operation.

Another object of the invention is to provide a novel leakproof inker having an internal inking member and an external ink supply container detachably coupled thereto, and wherein the only air inlet to the inking system is through the operative surfaces of the inking member.

Another object of the invention is to provide a novel internal-external inking unit having a tubular fitting which effectively couples a detachable ink container with the body portion of said unit.

Another object of the invention is to provide a novel inking system which is constructed and arranged so as to insure that any air introduced into the ink containing parts thereof is pemitted to flow to the highest ink level in the inking system.

Another object of the invention is to provide a novel inker wherein air is automatically metered into the inking system only at and through the operative inking surfaces thereof and at a rate corresponding to the rate at which ink leaves said surface.

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

In the drawings:

FIG. 1 is a front elevational view taken in partial section along section line 1—1 of FIG. 2 and illustrates the structural nature of the instant inker apparatus.

FIG. 2 is a plan view of the apparatus of FIG. 1 without the ink supply container coupled to the inker.

FIG. 3 is a sectional side elevational view taken along section line 3—3 of FIG. 2.

FIG. 4 is an enlarged sectional elevational view of a necked portion of the ink container and adjacent related parts.

FIGS. 5 and 6 are diagrammatic sketches showing illustrative modes of application of the instant inker.

Referrings to FIGS. 1 and 2 the instant inking device

comprises a frame or main body 10 having a right angle ink conducting passage 11 formed therethrough. Fixedly and sealingly secured to the main body 10 at the upper end of passage 11 is a tubular ink conducting fitting 12 that is formed at its upper end with conical outer surfaces 13 and four uniformly dimensioned and spaced slots 14. An ink supply container 15 is detachably coupled to the fitting 12; said container having a closed hollow body portion 16 and an integral depending tubular neck 17 that is adapted to slidably fit over the outer surfaces of the tubular fitting 12 so that ink disposed in the container may flow through neck 17, slots 14, tubular fitting 12 and into the said passage 11 of the main inker body 10. Rotatably mounted on the main body 10 at the horizontal outer end of the passage 11 is an ink roller 18 comprising a hollow roller hub 20 having a tubular extension 21 that is formed with cylindrical outer bearing surfaces 22 that cooperate with the adjacent walls of said passage 11. Threadedly secured on the outboard end of the roller hub is a cap 24 having an axial bearing projection 25 integrally formed thereon which is operatively disposed in an aperture 26 of a plastic bearing bushing 27. The bushing 27 is secured by any suitable means in and to the outer end 30 of an L-shaped cantilever support arm 31 that is fixedly secured at its inner end to the inker body 10 by suitable fastening means such as screws 32. Ink roller hub 20 is thus rotatably supported in the inker unit and is axially captured between the main body 10 and the outer end 30 of support arm 31. A tubular layer 33 of felt or similar porous material is secured on the outer cylindrical surfaces of the hub 20 and is axially disposed between the annular faces of the hub flange 34 and the cap 24.

The main body 10 is formed with an annular recess or couter bore 35 at the horizontal end of passage 11 and a scalloped polygonal-sectioned resilient sealing ring 36 is seated therein so as to form a rotary seal between the inker body 10 and said tubular extension 21 of the roller hub 20. The roller hub 20 is axially formed with a tapered or conical bore 37 which extends throughout the length of the hub 20. The inner larger end of bore 37 communicates with the said body passage 11 while the outer end of the bore is sealed off by said bearing cap 24. The walls of tubular hub 20 are formed with a first longitudinal row of radially disposed apertures 40; a second such row of apertures 40*a*; and a third such row of apertures 40*b*, FIGS. 1 and 3. Each row of apertures is non-diametrically disposed with respect to each other row of apertures for reasons that will be discussed below.

The container 15, body passage 11, bore 37, apertures 40 and the porous outer layer of material 33 are thus constructed and arranged so as to cooperatively define a substantially closed inking system wherein air can enter and ink can leave the ink system only through the operative outer cylindrical inking surface 41 of the felt layer 33.

In the operation of the apparatus described in FIGS. 1–3 ink from container 15 is adapted to gravitate into and fill passage 11, hub bore 37, radial apertures 40, 40*a*, 40*b* and the pores of the roller felt. Ink is normally kept from escaping or flowing through the outer inking surface 41 of the felt by the capillary action of the ink in the pores of said layer 33. Also assisting in preventing such escaping ink flow is the fact that a partial vacuum will exist in that part of the container 15 above the upper surface of the reservoir of ink 42. Once the fluid system is filled from said inking surface 41 to the container 15 no ink can leave the system and no air can enter the system except through said inking surface 41. Here the ink which is always available on the cylindrical inking surface 41 may be withdrawn by contact with and

withdrawal of an external body on which it is desired to deposit a layer of ink. When such contact and withdrawal occur, usually by a rotation of the roller **18**, the ink will be progressively removed from the inking system and presently some air will be admitted to the fluid system through felt layer **33** in order to partially relieve the otherwise increasing vacuum in the upper part of container **15**. This slight flow of air into the inking system takes the form of a series of minute air bubbles **43** which when passing through the felt layer **33** and apertures **40** will rise to the top of bore **37** as illustrated in FIG. 1 and will then be able to laterally move upwardly along the inclined tapered surface of said bore. From the bore **37** bubbles **43** enter passage **11** and then rise to the top of the reservoir of ink **42** in container **15**. Thus as ink is progressively removed from the roller inking surface **41** air automatically enters the fluid system of the inker and in so doing tends to meter the flow of ink from the system. When contact between the external body and surface **41** terminates the mutually opposed flows of air and ink through the said surface **41** will cease and the fluid system will remain in a static condition of equilibrium wherein ink is always present at, but does not flow or leak from, said inking surface **41**.

It will be noted that the air bubbles **43** which enter the bore **37** through any given row of apertures **40**, **40***a* or **40***b* during an inking operation will for the most part rise to the upper surface of bore **37** and will flow along the upper bore surface rather than into the other rows of apertures in that as mentioned above none of the apertures are diametrically disposed with respect to one another. This disposition of apertures thus facilitates the uninterrupted flow of air bubbles to the top of the ink reservoir and minimizes air entrapment in those of the apertures that might otherwise be temporarily located near an uppermost vertical position.

The ink container **15**, FIG. 1, which constitutes a replaceable supply item, is preferably made of a plastic material. When the container becomes empty it is axially withdrawn from the tubular fitting **12** and a new container slidably assembled thereon. Each new container, such as at **15***a* shown in FIG. 4, is provided with a plastic sealing plug **45** that is wedged into the neck **17***a* of the container so that ink is initially sealed in the container. In this way a new container **15***a*, FIG. 4, may be inverted and the neck **17***a* thereof slid down over the upstanding fitting **12** without ink running out over the surrounding portions of the device. During this assembly the upper end of fitting **12** will engage and push the plastic plug **45** up through the container neck **17***a* so that ink can then flow down into passage **11**. The parts are dimensioned so that the plug **45** does not reach the top of the neck **17***a* until the lowermost end of said neck has slid down over fitting **12** to a point below the bottom of slots **14**: in this way no leaking will occur through slots **14** during the replacement of the container. As may be seen from FIG. 4 the container neck **17***a* is diametrically sized so as to be slightly expanded as it is pushed downwardly over the fitting **12**, the resulting tight engagement between the container neck and the fitting thereby insuring that no leakage will subsequently occur during extended operations of the inking device. After assembly of the new ink container the plug **45**, which has a specific gravity less than that of ink **42**, will rise to the upper surface of the ink reservoir, as illustrated by the dotted lines **45'** of FIG. 1, and will remain there in an unobstructive condition during the ensuing printing operations. When an ink container has been properly mounted on the tubular fitting **12** the slots **14** formed in the latter will permit the last bit of ink to be operatively drawn from the container.

The inker described in connection with FIGS. 1–4 may be employed in different ways in a printing machine, for example in FIG. 5 the ink roller **18** may rotatably contact a rotary printing die **46** directly or, as shown in FIG. 6, it may contact an intermediate felt covered type roller **47** that in turn contacts the rotary printing die **46**. In either case a film of ink is deposited on the operative surfaces of the printing die for transfer to the sheet **48** being printed on. Inking devices similar to that described above have been built and tested and have been found to be exceptionally reliable and efficient for extended periods of time.

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. In an inking device:

a main body member, said main body member having an ink conducting passage formed therethrough, said passage having an upright portion and a horizontal portion;

a tubular fitting member mounted on said main body member and having a bore formed therethrough which communicates with said upright portion of said passage;

an ink container having a single fluid conducting opening therein defined by a depending tubular neck that is adapted to slidably fit down over the upper end of said tubular fitting member so as to thereby form a sealed connection with said tubular fitting member;

the said single fluid conducting opening in said ink container, the bore in said tubular fitting member and the ink conducting passage in said main body member being in coextensive communicating ink conducting relation, the upper end of said tubular fitting member being formed to facilitate the reception of said tubular container neck;

an inking roller hub having one end that is rotatably mounted in said main body member, said hub having a tapered axial bore formed therein which communicates with said horizontal portion of said ink conducting passage, said hub also having a plurality of apertures formed through the peripheral walls thereof;

a cantilever arm fixedly mounted on said main body member and having a free outer end that is adapted to rotatably support the other end of said inking roller hub;

a sealing ring operatively disposed between said hub and said main body member; and

a layer of porous material secured to the periphery of said hub so that the pore cavities of said material communicate with said tapered bore through said apertures so as to thereby form a substantially closed inking system wherein air can enter and ink can leave said system only through the operative surfaces of said porous material.

2. Apparatus as defined by claim **1** wherein the upper end of said tubular fitting member is formed with a tapered outer surface and at least one slot.

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