June 28, 1966 E. O. STRUDWICK 3,257,940

DAMPENING SYSTEM FOR LITHOGRAPHIC OFFSET PRINTING PRESSES

Filed Nov. 23, 1962 2 Sheets-Sheet 1

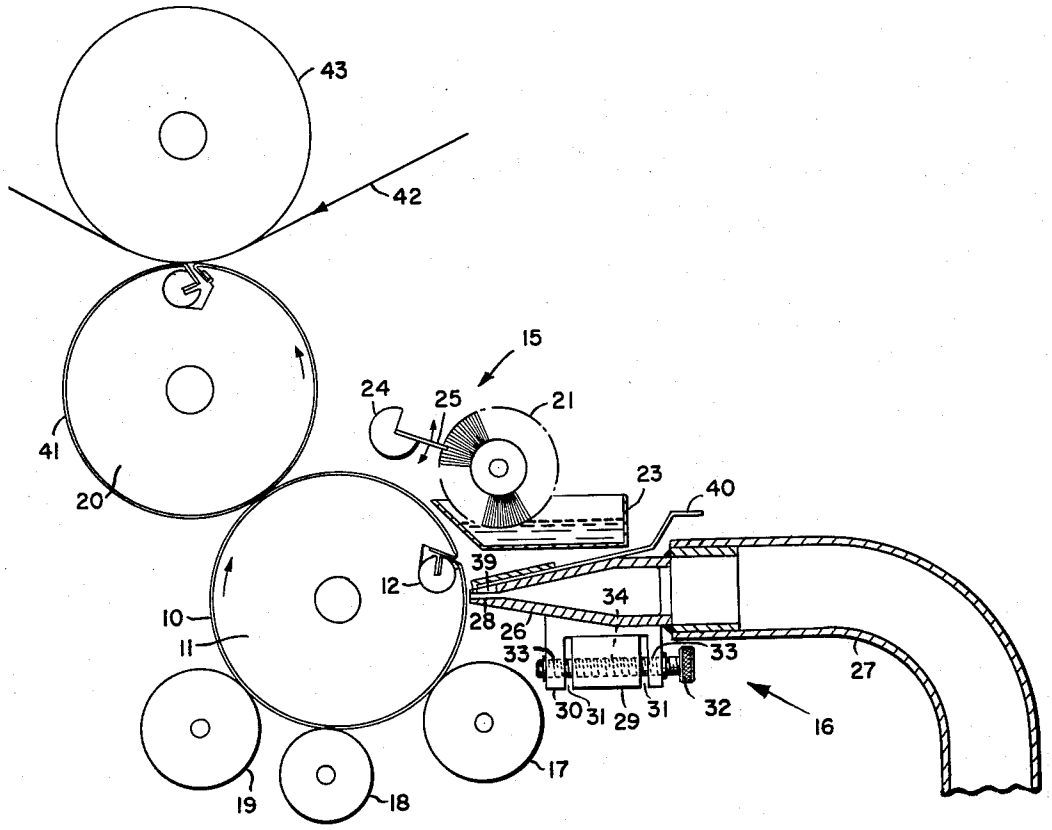


FIG. 1.

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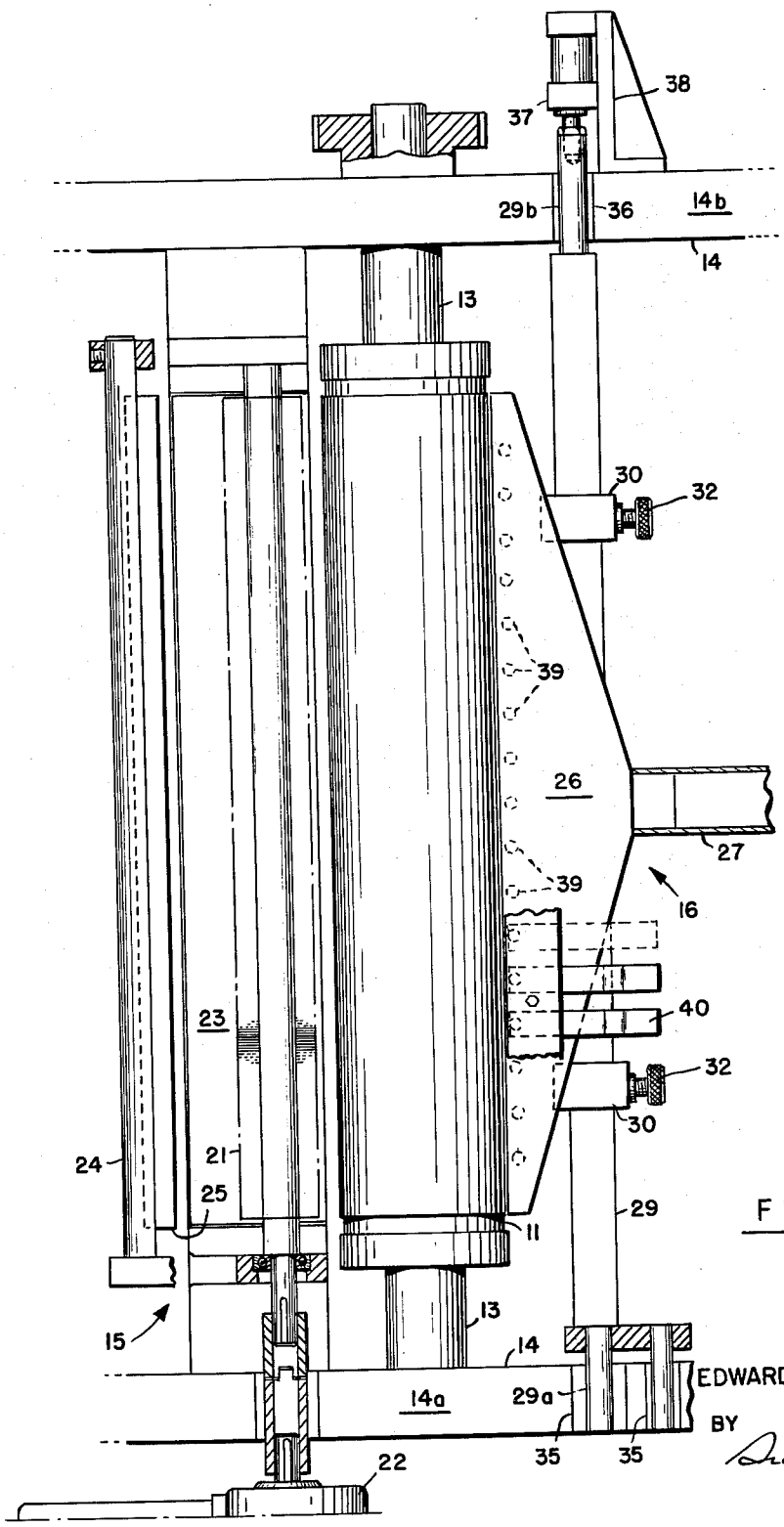


FIG. 2.

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United States Patent Office 3,257,940 Patented June 28, 1966

3,257,940

DAMPENING SYSTEM FOR LITHOGRAPHIC OFFSET PRINTING PRESSES

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Filed Nov. 23, 1962, Ser. No. 239,729
1 Claim. (Cl. 101—148)

This invention relates to lithographic offset printing, and more specifically concerns the control of the fountain solution or dampening agent applied to the metal plate bearing the form or material to be printed which is wrapped about the plate cylinder of an offset printing press.

In the offset printing process the metal plate as prepared for application to the plate cylinder carries the form to be printed in copper or other surfacing which repels the fountain solution while retaining the ink whereas the other or non-printing portions of the plate are provided with a chrome or other surfacing which has an affinity for the fountain solution which in turn repels the ink, the ink having a greasy or oily consistency—thus resulting in only the form itself being inked. The fountain solution is conventionally applied to the plate cylinder through a series of rolls culminating in a roll covered with a dampened "sock" bearing against the plate cylinder as it rotates. Ink is next applied usually through an arrangement of three rolls at the end of a roll chain system leading from the ink supply and breaking down the ink to thin film condition for application to the plate cylinder. The inked form is then "offset" onto a rubber blanketed roll or cylinder from which it is printed onto a paper web following a path about another roll or cylinder.

In the offset printing process as outlined above, proper control of the amount of fountain solution applied to or retained by the printing plate is essential to a high quality printed product. An excess amount of fountain solution on the plate will result in a spotty, washed out, low quality final printed product, while a deficient amount will result in pick up or retention of ink on portions of the plate not a part of the form to be reproduced with the obvious consequence of a defective final printed product. The conventional means of applying fountain solution, referred to above, involves considerable equipment with little control and with other disadvantages, and depends for any success it may have upon application of the correct amount of fountain solution. This invention, having for its primary objective the solution to this critical fountain solution control problem, contemplates an approach thereto different from that of the means heretofore known—rather than endeavoring to control precisely the amount of fountain solution applied to the plate, it concerns itself simply with initially applying at least an adequate amount and then carefully controlling the amount retained on the plate by removing the excess. Removal of such excess is accomplished by this invention through the application of suitable vacuum, whereby the fountain solution is readily removed from the printing area while the affinity of the non-printing area for the fountain solution prevents removal thereof from this portion of the plate. Utilization of vacuum means to effect removal of fountain solution remaining on the plate after inking is also within the contemplation of this invention in order to avoid excessive wetting of the paper web.

A further important advantage of this invention is the accomplishment of sharper line delineation as well as of greater definition in the final printed form, due to the fact that the vacuum as applied tends to take advantage of mutual attraction of droplets of fountain solution adjacent to each other but on differing surfaces one of

which attracts and the other of which repels the fountain solution.

Another advantage of the invention is that it makes possible the retrieval of the excess fountain solution through the vacuum system for re-use after filtering, this fountain solution being expensive and lost after one use in systems heretofore known.

Still a further advantage of the invention is elimination of the need for relatively elaborate means endeavoring to accomplish initial application of the precisely correct amount of fountain solution, the invention contemplating instead application of at least a sufficiency of fountain solution through simplified means, whether brush applicators, spray nozzles, or other. Of course any means of application of fountain solution in current use could be retained while still deriving the advantages of the vacuum means of this invention.

The invention and the manner of attaining its objectives, together with the foregoing advantages as well as others which will be evident, will be readily understood from a reading of the following specification, considered together with the accompanying drawings, in which:

FIGURE 1 is an elevation view partly in cross-section of a part of an offset printing press illustrating the invention and showing the printing plate, the plate cylinder, fountain solution application means, vacuum means, and inking rolls; and

FIGURE 2 is an alignment or stretched-out plan view showing the plate cylinder, fountain solution application means, and vacuum means of FIGURE 1.

In the embodiment of the invention illustrated herein, printing plate **10** bearing the form to be printed may be of metal with its printing portions comprising a surfacing such as copper which will repel the fountain solution while retaining the ink applied thereto and with its non-printing portions comprising a surfacing such as chrome which will attract the fountain solution while repelling the ink. Plate **10** envelops the periphery of plate cylinder **11**, being tightened and fastened thereabout by conventional locking means **12**. Plate cylinder **11** terminates in journals **13** at its ends and is rotatably mounted in stand **14**. Positioned about plate cylinder **11**, sequentially in the direction of its rotation as indicated in FIGURE 1, are first, brush applicator means **15** for applying fountain solution to printing plate **10**, secondly, vacuum means **16** for removing excess fountain solution from printing plate **10**, thirdly, inking rolls **17**, **18**, and **19** for applying ink to printing plate **10**, and finally, conventional offset cylinder **20**. It is to be noted particularly that FIGURE 2 necessarily for clarity shows brush applicator means **15** on the opposite side of plate cylinder **11** from vacuum means **16**. FIGURE 1 however depicts the true positional relationships of these means.

In brush applicator means **15**, brush roll **21** is juxtaposed parallel to plate cylinder **11**, being mounted in stand **14** so as to be rotatable independently of plate cylinder **11**, through suitable drive means such as gearhead D.C. motor **22**, shown in block outline in FIGURE 2. Fountain solution vat **23** extending lengthwise of brush roll **21** is fixedly mounted to stand **14** beneath roll **21** so that the brush of roll **21** will pass through the fountain solution contained in vat **23** as roll **21** rotates. Suitably juxtaposed parallel to brush roll **21** and adjustably mounted to stand **14** is segmented cylindrical rod **24** to which is attached blade **25** extending longitudinally thereof and extending radially therefrom sufficiently for the brush of roll **21** to wipe against blade **25** as roll **21** rotates, such wiping action being effective to transfer the fountain solution from brush roll **21** to printing plate **10**.

In vacuum means **16**, next in sequential order about plate cylinder **11** in the direction of its rotation, vacuum head **26** extends lengthwise of the plate cylinder **11** and is

connected by conventional tubular means **27** to a suitable vacuum pump, not shown. Conventional means for separation of recovered fountain solution and filtering and return thereof to vat **23** for re-use, though not shown, may be readily incorporated in association with tubular means **27**. Vacuum head **26** terminates proximately of plate cylinder **11** in orifice or nozzle **28**, and is mounted so as to be positionally adjustable with respect to plate cylinder **11** through the medium of rectangular cross-sectioned mounting bar **29** which is assembled to stand **14**. Inverted U-shaped mounting brackets **30** affixed to vacuum head **26** overlap mounting bar **29** with horizontal clearances **31** sufficient to provide desired limits of vacuum head **26** positional adjustment with respect to plate cylinder **11**, and manipulation of turn screws **32** extending through clearance holes **33** in brackets **30** and internally threaded holes **34** in mounting bar **29** accomplishes the desired positional setting. Mounting bar **29** is assembled to stand **14** so as to permit limited longitudinal vibration thereof through a displacement on the order of a small fraction of an inch with respect to stand **14**. End **29***a* of mounting bar **29**, comprising a clamp to prevent bar **29** from rotating, is slidably mounted to the operating side **14***a* of stand **14** through holes **35**, and end **29***b* of mounting bar **29** is slidably mounted to the drive side **14***b* of stand **14** through hole **36**. Reciprocating piston motor **37** is affixed to drive side **14***b* of stand **14** by means of bracket **38**, being threadably assembled to mounting bar **29** in axial alignment therewith, operation of motor **37** thereby providing vibratory motion of mounting bar **29** and of vacuum head **26** longitudinally of the face of plate cylinder **11**. Selective adjustment of the amounts of vacuum applied across the face of plate cylinder **11** is achieved through the system of ports **39** in vacuum head **26** spaced longitudinally of plate cylinder **11**, each of such ports **39** being provided with its independently operable closure or valve **40**.

Inking rolls **17**, **18**, and **19**, next in sequential order about plate cylinder **11** in the direction of its rotation are rotatably mounted to bear against printing plate **10** in its position about the periphery of plate cylinder **11**, as shown in FIGURE 1. Ink in thin film condition suitable for application to the plate **10** may be provided to the inking rolls **17**, **18**, and **19** through a suitable ink-breakdown roll chain, not shown, leading from an ink supply reservoir or fountain.

Finally in sequential order about plate cylinder **11** in the direction of its rotation, offset cylinder **20**, rotatably mounted, is provided with rubber blanket **41**, enveloping and fastened about the cylinder. The form to be printed is offset onto this rubber blanketed cylinder **20** from plate **10** on plate cylinder **11**, and finally printed onto paper web **42** travelling between offset cylinder **20** and impression cylinder **43**. Multiple color printing can be readily achieved through positioning additional offset cylinders about impression cylinder **43**, the form to be printed by each such additional offset cylinder being provided by an additional plate cylinder and facilities for applying fountain solution and inking, duplicating those already described as associated with plate cylinder **11**. Printing simultaneously on both sides of paper web **42** can of course be achieved by replacing impression cylinder **43** with an additional offset cylinder and its associated facilities, again duplicating those already described as associated with plate cylinder **11**.

Flexibility and adjustablility are important features of this invention. The amount of fountain solution being applied to printing plate **10** can be varied to suit conditions by adjusting the speed of motor **22** driving brush roll **21** as well as by adjusting angular positioning of blade **25** with respect to brush roll **21** through rotation of cylindrical rod **24**. Optimum effectiveness of vacuum applied to plate **10** through vacuum head **26** may be achieved by selection of overall degree of vacuum applied to vacuum head **26** through tubular means **27**, by positioning of vacuum head **26** relative to plate cylinder **11** through adjustment of turn screws **32** either for a selected constant clearance across the face of plate cylinder **11** or for a progressively greater clearance moving from one end of the cylinder to the other, and by selective adjustment of valves **40** to close, partially open, or fully open selected ones of ports **39** to achieve different degrees of vacuum at different positions across the face of cylinder **11**. Optimum settings will vary depending upon the nature of the form to be reproduced, its tonal variations, solidity, etc. Longitudinal vibration of vacuum head **26** through operation of piston motor **37** may be utilized to increase effectiveness of the vacuum in removing moisture droplets from plate **10**, tending to overcome surface tension or mutual attraction of the droplets to each other. Although not shown in the illustrated embodiment, the invention contemplates utilization when desired of a second vacuum head, positioned with respect to plate cylinder **11** in its direction of rotation between the last inking roll **19** and offset cylinder **20**, for further application of vacuum to printing plate **10** after inking to remove remaining fountain solution from plate **10** before offsetting of the form to be printed onto rubber blanketed offset clyinder **20**.

It should be noted that added advantages of the vacuum means of this invention include substantial reduction in the amount of dampness transferred from plate **10** through rubber blanket **41** onto the paper web **42**, avoiding need of pre-conditioning the web for dimensional stability through pre-wetting and drying prior to printing. Vacuum head **26** may also be utilized to extract fountain solution accumulated in locking means **12** simply by positioning plate cylinder **11** so as to juxtapose the nozzle **28** of vacuum head **26** and locking means **12**.

It should be understood that the present disclosure has been made only for the purpose of illustration of a preferred embodiment of this invention, that numerous changes in the details of construction and the combination and arrangement of parts may be resorted to without departing from the spirit and the scope of the invention, and that the invention includes all modifications and equivalents which come within the scope of the appended claim.

I claim:

In an offset printing press, a stand, a plate cylinder rotatably mounted in said stand, a printing plate affixed about the periphery of said plate cylinder, brush applicator means for applying fountain solution to said printing plate, and vacuum means for removing excess fountain solution from said printing plate, said brush applicator means including a brush roll juxtaposed parallel to said plate cylinder and rotatably mounted in said stand, a fountain solution vat extending lengthwise of said brush roll and fixedly mounted to said stand beneath said brush roll so that said brush roll passes through the fountain solution vat as said brush roll rotates, a segmented cylindrical rod juxtaposed parallel to said brush roll and adjustably mounted to said stand, a blade attached to said rod and extending longitudinally thereof and extending radially therefrom so that said brush roll wipes against said blade as said brush roll rotates, and said vacuum means including a vacuum head having a nozzle extending longitudinally of said plate cylinder and positioned proximately thereof, an elongated mounting bar assembled to said stand with its longitudinal axis parallel to the longitudinal axis of the plate cylinder so as to maintain a constant distance between said longitudinal axes and so as to permit limited longitudinal displacement of said mounting bar relative to said stand, a plurality of U-shaped mounting brackets affixed to said vacuum head, turn screws assembling said U-shaped mounting brackets to said mounting bar so that adjustment of said turn screws displaces said vacuum head relative to said mounting bar so as to vary the clearance between the vacuum head nozzle and the printing plate, and drive means assembled to said mounting bar so as to provide longitudinal vibratory

movement of said mounting bar relative to said stand and of said vacuum head nozzle relative to said printing plate, said vacuum head having a plurality of ports therein and an independently operable valve for each port, a vacuum pump, and tubular means connecting said vacuum head to said vacuum pump.

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