Nov. 2, 1943. A. WEISS 2,333,220

WEB AND AIR CONDITIONING MEANS

Original Filed May 7, 1940 3 Sheets-Sheet 1

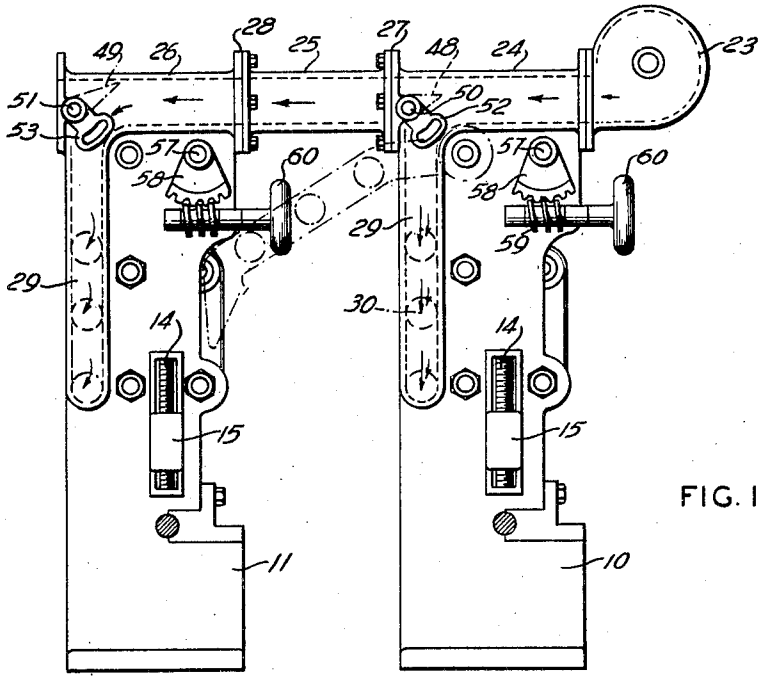


FIG. 1

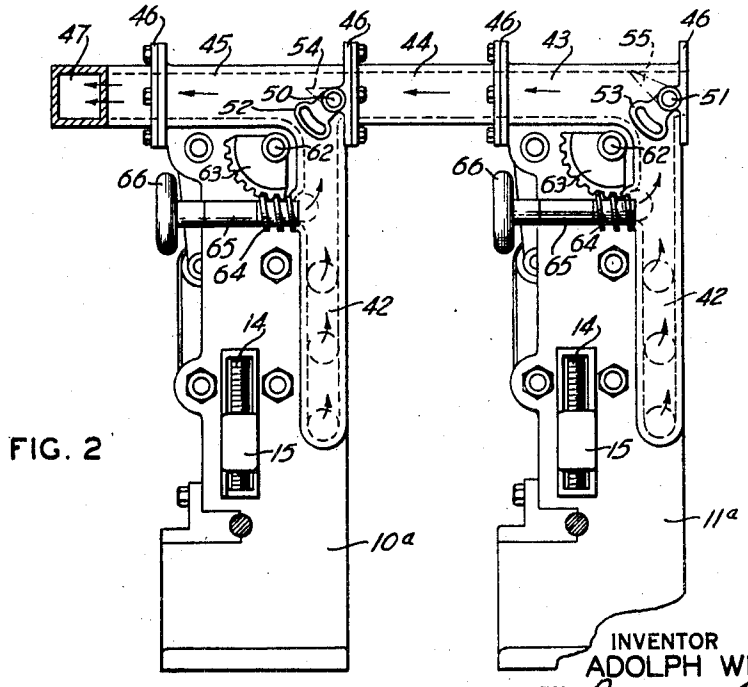


FIG. 2

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WEB AND AIR CONDITIONING MEANS

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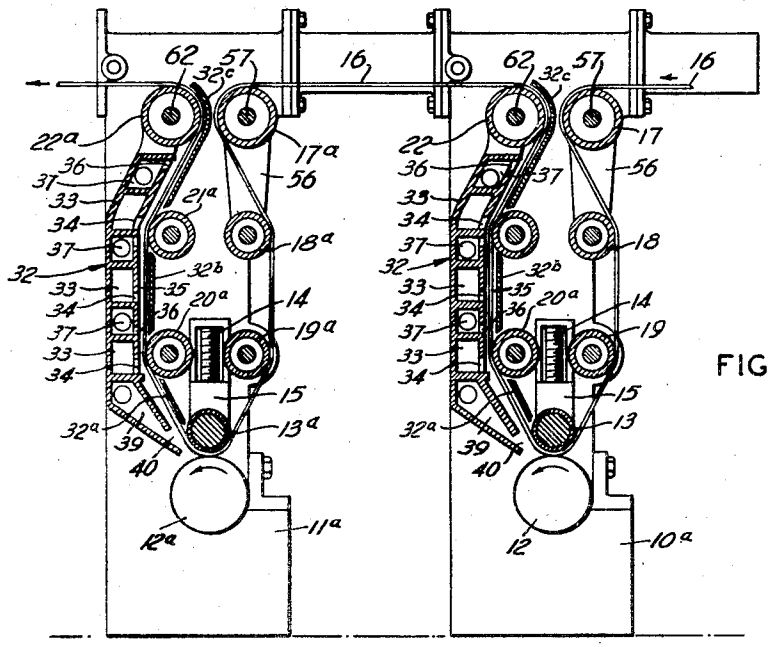


FIG. 3

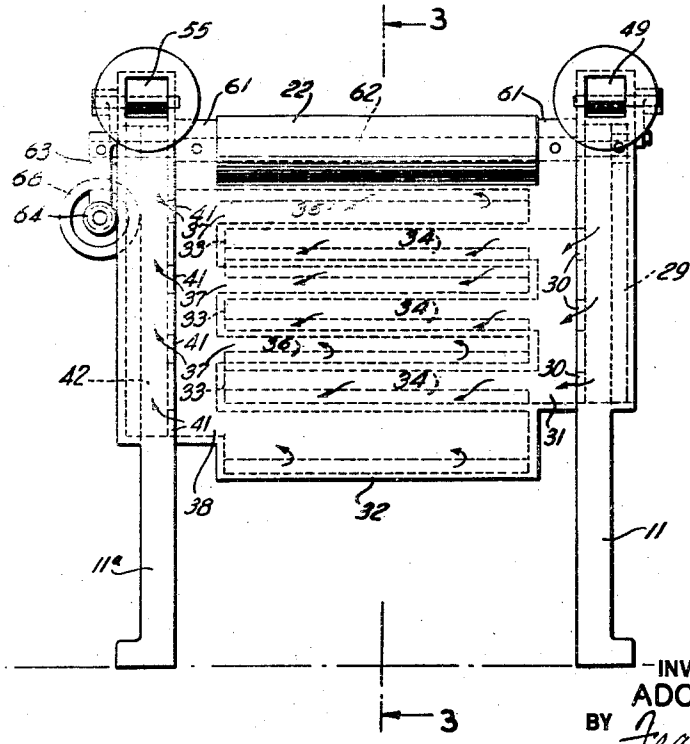


FIG. 4

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WEB AND AIR CONDITIONING MEANS

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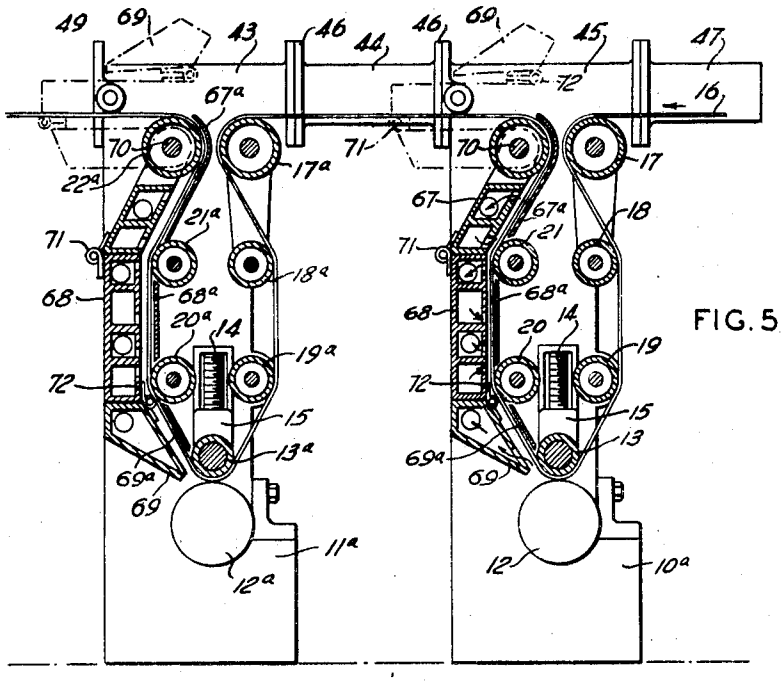


FIG. 5

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UNITED STATES PATENT OFFICE

2,333,220

WEB AND AIR CONDITIONING MEANS

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Original application May 7, 1940, Serial No. 333,712. Divided and this application June 7, 1941, Serial No. 397,091

13 Claims. (Cl. 101—152)

This invention relates to web and air conditioning means for printing, coating and other machines of a like character, whereby localized treatment may be employed for conditioning webs which have been printed, coated or otherwise operated upon; for conditioning the air surrounding treated portions of the web so as to regulate its temperature, moisture and chemical content; for fixing or drying the inks on freshly printed webs; for diluting and disposing of the vapors emanating from webs printed with inks employing volatile solvents; for the control of static and prevention of explosion; and for various other purposes to which such localized treatments are applicable. The invention is particularly well suited for the localized treatment of printed webs in rotary intaglio printing presses for conditioning the webs and ventilating the air surrounding those portions of the webs which are under localized treatment.

Due to recent advances in the art of rotary intaglio printing, the operating speeds of the presses have been increased to such an extent that, at the present time, surface production of 7200 square inches per minute is not unusual. Rotary intaglio printing presses of today are, therefore, characterized by high operating speeds and printed surface production, and, inasmuch as the inks employed dry by the evaporation of their highly volatile solvents, enormous volumes of vapors must be disposed of. In view of these conditions, and especially in multicolor rotary intaglio printing presses wherein from 5 to 8 impressions may be made on a swiftly moving web and heat is usually applied for increasing the rate of evaporation and shortening the distance between impression centers, the disposal of the vapors arising from the evaporation of volatile solvents creates a major problem.

Various forms of web treating and ventilating systems have been devised for conditioning printed webs and ventilating pressrooms with a view to protecting the health of the operators and avoiding explosions from the ignition of gaseous vapors while speeding up the web drying operation. However, for one reason or another, these systems have not been entirely satisfactory and practicable. Probably one of the most important objections to prior devices for conditioning printed webs is that they involve the addition of cumbersome structures to the press supporting frame for providing the necessary pipes and ducts, such addition requiring too much space and greatly increasing the costs of construction and installation. Moreover, such installations render the entire printing press unsightly by the addition of structure extraneous to the press framework which supports it. Another and even more important objection to the prior known web treating and ventilating systems is that they render the printing units themselves inaccessible so that it is difficult and even impossible to thread the press efficiently and make any adjustments or changes that may be required in the printing elements. Thus, the prior known forms of web treating and ventilating systems prevent free access to the web conveying and press mechanism and constitute decided handicaps to efficient operation of the press, often causing expensive delays in production.

I have found that all of these difficulties may be eliminated and have provided an improved printing press including improved means for conditioning the printed web and for ventilating the adjacent air, the construction of the press and its associated web guiding and conditioning means being such that ready access may be had to the printing units at all times.

In accordance with my invention, the side frames of the printing press are utilized for the housing of ducts for supplying a web treating medium and exhausting such medium together with the solvent vapors from the ink; and duct containing members are suitably disposed between the frames and in the path of the moving web. To provide a restricted drying chamber conforming to the predetermined path of the printed web, suitable plates or slides are disposed between the duct containing frames and on the side of the web opposite the duct containing members. For gaining access to the web and the printing elements without disturbing the path of the web, the duct containing members or portions of the frames with which they are associated are movable or separable. In this manner, I have obviated all difficulties in prior known presses having web conditioning means and simultaneously have reduced the number of parts, reduced construction and installation costs, increased the efficiency of the entire press, improved the quality of the printed matter and rendered the entire appearance of the press more pleasing.

The above and other objects and advantages of my invention will be apparent upon consideration of the following detailed description of now preferred embodiments thereof and the accompanying drawings, in which:

Fig. 1 is a side elevation of one of the preferred embodiments of my invention in a two-unit ro-

tary intaglio printing press as viewed from the operating side or from the right of Fig. 4;

Fig. 2 is a similar side elevation of the opposite side of said printing press taken from the left in Fig. 4;

Fig. 3 is a vertical longitudinal section of the printing press taken on the line 3—3 of Fig. 4;

Fig. 4 is an end elevation of either press unit when viewed from the left in Fig. 1; and

Fig. 5 is a vertical longitudinal section similar to Fig. 3 showing a modified construction for the partition or frame member in which the supply and exhaust ducts of the drying and ventilating system are incorporated.

Referring now to the drawings, Figs. 1 to 4 show one preferred embodiment of my invention in a two-unit rotary intaglio printing press provided with laterally spaced side frames 10 and 10a of one unit and laterally spaced side frames 11 and 11a of the other unit, said side frames being mounted on a common bed plate (not shown). Arranged between the laterally spaced side frame and rotatable about transverse axes are printing cylinders 12 and 12a and cooperatively arranged with respect thereto are impression cylinders 13 and 13a. As shown in Figs. 1, 2 and 3 of the drawings, screws 14 are threaded into suitable bearing supports 15 at opposite sides of both press units for adjusting the vertical positions of bearings (not shown in the drawings) for the impression cylinders with respect to the printing cylinders in the usual manner. As indicated in Fig. 3 of the drawings, a continuous web 16 is supplied to the press over a receiving guide roller 17 and passes downwardly over guide rollers 18 and 19 to the impression cylinder 13 of the first press unit. Moving upwardly over the guide rollers 20 and 21 in a predetermined path from the impression cylinder, the continuous web passes over a delivery guide roller 22 to the receiving guide roller 17a of the next press unit in series and in sequence moves downwardly over guide rollers 18a and 19a to the impression cylinder 13a of the second press unit from which it passes upwardly over guide rollers 20a and 21a to the next delivery guide roller 22a. It will be understood from this description that this path of movement for the continuous web through each unit, is repeated as many times as there are press units included in the press.

Referring now to Fig. 1 of the drawings, means for supplying a web-treating medium such, for example, as air under pressure to the web-conditioning apparatus to be presently described, is provided in the form of a blower 23 which delivers said medium to a pressure main comprising successive sections 24, 25, 26, etc., said sections being provided with attachment flanges 27, 28, etc., for the purpose of installing additional press units or for disconnecting some of the units therefrom to provide the desired number of press units in a multicolor press. Extending downwardly from each of the sections 24 and 26 of the pressure main as shown in Figs. 1 and 4 of the drawings, is a conduit 29 which opens through port openings 30 (Fig. 4) into a manifold chamber 31 which, according to this embodiment of my invention, is formed in a transverse duct-containing member 32, extending between the side frames 10 and 10a. As shown in Figs. 3 and 4 of the drawings, these duct-containing members are provided with spaced horizontal ducts 33 which open from the manifold chambers 31 and are provided with discharge outlets 34 preferably extending the full length of said ducts and completely across the web as it moves in a predetermined path from the impression cylinder 13 to the delivery guide roller 22. As seen in Fig. 3 of the drawings, the rear wall of member 32 is spaced from and substantially conforms to the predetermined path of the printed web 16. Extending between the side frames 10 and 10a in the rear of the printed web are a plurality of plates or slides 32a, 32b, and 32c, which form with the duct member 32, restricted drying chambers 35 through which the printed portions of the web move upwardly from the first and second printing couples toward their respective delivery guide rollers 22, 22a. Leading from the drying chambers 35 through port openings 36 which preferably extend entirely across the width of the printed web, are exhaust ducts 37, the horizontally disposed pressure ducts 33 and exhaust ducts 37 being preferably arranged in alternation with each other in vertical series in both duct members.

In the particular embodiment of my invention herein shown, pressure ducts 33 are in open communication with the manifold chamber 31 at its right end (according to Fig. 4) while the exhaust ducts 37 are in open communication at their left ends with a manifold chamber 38 formed in the associated frame member 32 adjacent the side frame 10a. Extending across the duct or frame members 32 at the bottom are terminal exhaust chambers 39 which are contracted downwardly toward the tangential planes of the printing and impression cylinders of the respective printing units and are provided with intake openings 40 presented in close juxtaposition to those portions of the printed web leaving said printing units. By an inspection of the duct member 32 as shown in Fig. 3, it will be seen that the vertical series of alternately disposed horizontal pressure and suction ducts are preferably arranged with suction ducts 37 and suction chambers 39 at the upper and lower ends respectively of the web-treating chambers 35 formed between duct members 32 and plates 32a, 32b and 32c. It should be explained further that the best results are secured by providing a suction capacity considerably in excess of the discharge capacity of the web-treating medium ducts to insure removal of all products of the web-conditioning treatment. It will be understood from this description that the subdivided currents of web-treating medium discharge in separate blasts which impinge on the moving continuous web and after passing in whirling eddies over localized areas of said web are sucked into and through the exhaust ducts.

It will be seen in Figs. 2 and 4 of the drawings that the exhaust conduits 42 open at their upper ends into an exhaust main shown in Fig. 2 of the drawings, said exhaust main comprising a series of sections 43, 44, 45, etc., provided with attachment flanges 46. Leading from section 45 of the exhaust main is an extension 47 thereof which is connected to a suction fan or exhaust pump (not shown) for removing the mixed gases, air and other undesired elements from the press and in large measure eliminating static on the web. Where there are several presses arranged in a single room or building, the supply and exhaust mains leading to and from the drying and ventilating chambers therefor, are readily connected up in an air conditioning system which, if desired, may further include suitable apparatus for recovering the solvents by a con-

densation of the vapors emanating from the printed web.

Referring to Figs. 1 and 2 of the drawings, it will be understood that sections **24**, **25**, **26**, etc., of the pressure main are preferably constructed in the detachably connected sections of the press and correspond in length and arrangement to sections **45**, **44**, **43**, respectively of the exhaust main so that the press units may be installed or removed at will to provide an installation of any desired size. At the same time the pressure and exhaust mains including the side frame spacing sections **25** and **44**, constitute laterally spaced rigid top frame members for rigidly uniting any desired number of press units which may be included in the installation. For the purpose of securing a proper distribution of the drying medium to the several web drying and press ventilating chambers and regulation of the exhaust through pressure channels of different length connected in parallel, I preferably employ adjustable louvers **48**, **49** of suitable construction for closing the upper ends of pressure conduits **29** in greater or lesser degree for properly regulating the current flows in different conduits to correspond to the respective requirements for the several press units. For this purpose, each of the louvers may be separately adjusted or when conditions permit, the pressure louvers and exhaust regulating louvers (described below) for each unit may be adjusted in unison. Thus as indicated at the top of Fig. **1** of the drawings, louvers **48** and **49** are mounted on transverse shafts **50** and **51** respectively, said shafts being provided at their outer ends with slotted arms **52** and **53** whereby said louvers may be secured in adjusted positions by means of studs or bolts (not shown) threaded into the frame through the slots in said arms. In the form shown, shafts **50** and **51** are extended to and through the exhaust main at the other side of the press and have louvers **54** and **55** mounted thereon for regulating the exhaust from conduits **42** to correspond to the regulation of inflow of the drying medium at the upper ends of pressure conduits **29** shown in Fig. 1.

Suitable and effective means for imparting relative longitudinal adjustments to different portions of the continuous web for securing registration of the impressions made on said web by successive press units, may be provided in the manner shown in Figs. 2 and 3 wherein the guide rollers **18** and **18***a* are shown to be journaled in depending arms **56** keyed to transverse shafts **57**. Keyed to the outer ends of shafts **57** are segmental worm gears **58** with which worms **59** are in mesh, said worms being mounted on suitable shafts provided with hand wheels **60** for moving the guide rollers back and forth for varying the path length of one portion of the web relatively to another.

As shown in Fig. 4 of the drawings, the transverse duct containing frame members **32** are preferably provided with axially spaced bearing lugs **61** keyed to shafts **62** upon which the delivery guide rollers **22** and **22***a* are freely journaled. Keyed to the outer ends of shafts **62** as shown in Fig. 2 are worm gear segments **63** which are in mesh with worms **64** on shafts rotatable in bearings **65** and provided with hand wheels **66** whereby said duct containing members may be moved away from the web as indicated by broken lines for the right hand press unit shown in Fig. 1 for giving free access to the press units.

According to Fig. 5 of the drawings, and for the purpose of uncovering the press units, the duct or frame members are each constructed in three sections **67**, **68** and **69**, the sections **67** are keyed at their upper ends to the delivery guide roller shafts **70** and are hinged at their lower ends at **71** to the adjacent sections **68** which in turn are hinged at **72** to sections **69**. It will be understood from this description that by imparting a clockwise movement to section **67** about the axis of shaft **70** and a further clockwise movement of section **68** on hinge **71** with a counterclockwise movement of section **69** in hinge **72**, these sections are readily folded together at the top of the press as shown in broken lines in Fig. 5. In their operative arrangement shown in Fig. 5, it will be seen that the rear surfaces of sections **67**, **68**, and **69** of the collapsible frame members form substantially continuous walls which are spaced from and conform to the printed webs moving from the printing couples. A series of plates **67***a*, **68***a*, and **69***a* which are preferably in the form of slides extend between the opposite side frames and form with the duct members restricted chambers through which the printed web portions travel in leaving the respective printing couples and within which said web portions are subjected to a conditioning treatment similar to that described above.

From the foregoing description it will be understood that I have provided, in machines operating on webs, means of novel form and construction for conditioning the webs and ventilating the surrounding air. More especially, I have provided web conditioning and ventilating means of the character described in connection with rotary intaglio printing presses. For this purpose, I have provided a drying and ventilating system of the character referred to for rotary intaglio printing presses embodying a reduced number of parts of improved construction arranged in a novel manner for reducing construction and installation costs; for increasing the efficiency of operators and printing presses; and for rendering installations of this character less unsightly.

I have further incorporated in the supporting frame structure of a rotary intaglio printing press, a novel construction and arrangement of a supply main, conduits branching therefrom and ducts through which a web-treating medium is supplied to a drying chamber through which the printed web moves. It is also clear that I have incorporated in the supporting frame structure of a rotary intaglio printing press, a novel construction and arrangement of exhaust ducts and conduits leading to an exhaust main formed in the frame structure for conveying the noxious vapors from one or more press units. I have furthermore incorporated in the supporting frame structure of a rotary intaglio printing press a combined medium supply and exhaust system for the localized drying of the printed web and ventilation of the air surrounding said web. It will also be seen that I have provided a novel form and arrangement of supply and exhaust systems of the character referred to which is suitable for inclusion in an air conditioning system operated in connection with the press room.

Although I have illustrated and described simple and preferred forms of my invention, it will be understood that no limitation is necessarily made to the press structural details shown, and various changes may be made in the construction and certain features thereof employed without others, without departing from my invention or sacrificing any of its advantages.

This application is a division of my application

Serial No. 333,712, filed May 7, 1940, and which issued on January 13, 1942, as Patent No. 2,269,836.

What I claim is:

1. In a rotary intaglio printing press comprising a plurality of serially arranged press units for successive printings on a continuous web, the combination with web printing and impression cylinders for said press units respectively, of spaced frames for said press units respectively, duct containing members for conveying web drying and ventilating medium to and noxious gases from the respective press units, a pressure main for the web drying and ventilating medium, and an exhaust main for said noxious gases, said mains constituting laterally spaced stress members for all of said press units and comprising separably connected sections whereby the press units may be connected up and disconnected at will.

2. In a supporting structure for a printing press comprising a plurality of separable press units for successive printings on a continuous web, the combination of a plurality of pairs of laterally spaced side frame sections for the respective press units, and duct containing members extending between opposite side frame sections of said press units, the side frame sections of said press units being formed with pressure main and exhaust main sections incorporated therein and with pressure and exhaust conduits branching from and leading to said main sections respectively within said side frame sections, said duct containing members being provided with pressure ducts leading from said pressure conduits and with exhaust ducts leading to said exhaust conduits, said pressure and exhaust ducts being provided with discharge outlets and exhaust intakes presented towards the printed sections of said web.

3. In a rotary intaglio printing press comprising a plurality of serially arranged press units for successive printings on a continuous web, the combination with web printing and impression cylinders for said press units respectively, of spaced frames for said press units respectively, duct containing members movably mounted between said spaced frames for conveying web drying and ventilating medium to and noxious gases from the respective press units, a pressure main for the web drying and ventilating medium, and an exhaust main for said noxious gases, said mains being operatively associated with said spaced frames and constituting laterally spaced stress members for all of said press units and comprising separably connected sections whereby the press units may be connected up and disconnected at will.

4. In a rotary intaglio printing press comprising a plurality of serially arranged printing press units for successive printings on a continuous web, the combination with side frames provided with supply and exhaust ducts, of rotary printing couples for said units comprising printing and impression cylinders rotatable about upper and lower axes in spaced vertical planes, web guiding receiving and delivery rollers having shafts rotatable about parallel axes arranged in a common horizontal plane above the cylinders, duct containing members secured to said shafts respectively and conforming substantially to the web portion moving between the impression cylinders and delivery guide rollers for the respective press units and being adapted to convey a web drying and ventilating medium to and noxious gases from the respective press units, plates extending transversely between said side frames in spaced relation to said duct containing members respectively for forming web ventilating chambers, a pressure main for the web drying and ventilating medium in communication with said supply duct, and an exhaust main for said noxious gases associated with said exhaust duct, said mains constituting laterally spaced stress members for all of said press units and comprising separably connected sections whereby the press units may be connected up and disconnected at will.

5. In a rotary intaglio printing press comprising a plurality of serially arranged press units for successive printings on a continuous web, the combination with web printing and impression cylinders for said press units respectively, of spaced frames for said press units respectively, duct containing members for conveying web drying and ventilating medium to and noxious gases from the respective press units, a pressure main for the web drying and ventilating medium, and an exhaust main for said noxious gases, said mains constituting laterally spaced stress members for all of said press units and comprising separably connected sections whereby the press units may be connected up and disconnected at will, and said duct containing members being operatively and movably connected to said mains.

6. In a rotary intaglio printing press comprising a plurality of serially arranged press units for successive printings on a continuous web, the combination with web printing and impression cylinders for said press units respectively, of spaced frames for said press units respectively, duct containing members for conveying web drying and ventilating medium to and noxious gases from the respective press units, plates extending transversely between said spaced frames in spaced relation to said duct containing members respectively for forming web ventilating chambers, a pressure main for the web drying and ventilating medium, and an exhaust main for said noxious gases, said mains constituting laterally spaced stress members for all of said press units and comprising separably connected sections whereby the press units may be connected up and disconnected at will.

7. In a rotary intaglio printing press comprising a plurality of serially arranged press units for successive printings on a continuous web, the combination with web printing and impression cylinders for said press units respectively, of spaced frames for said press units respectively, duct containing members for conveying web drying and ventilating medium to and noxious gases from the respective press units, plates extending transversely between said spaced frame in spaced relation to said duct containing members respectively for forming web ventilating chambers, a pressure main for the web drying and ventilating medium, and an exhaust main for said noxious gases, said mains constituting laterally spaced stress members for all of said press units and comprising separably connected sections whereby the press units may be connected up and disconnected at will, and said duct containing members being movable away from said plates so as to permit access to the web.

8. In a rotary intaglio printing press comprising a plurality of serially arranged press units for successive printings on a continuous web, the combination with web printing and impression cylinders for said press units respectively, of

spaced frames for said press units respectively, duct containing members for conveying web drying and ventilating medium to and noxious gases from the respective press units, plates extending transversely between said spaced frames in spaced relation to said duct containing members respectively for forming web ventilating chambers, a pressure main for the web drying and ventilating medium, and an exhaust main for said noxious gases, said mains constituting laterally spaced stress members for all of said press units and comprising separably connected sections whereby the press units may be connected up and disconnected at will, said duct containing members being collapsibly constructed and movable to a position affording free access to the web.

9. In a rotary intaglio printing press comprising a plurality of serially arranged press units for successive printings on a continuous web, the combination with web printing and impression cylinders for said press units respectively, of spaced frames for said press units respectively, duct containing members for conveying web drying and ventilating medium to and noxious gases from the respective press units, plates extending transversely between said spaced frames in spaced relation to said duct containing members respectively for forming web ventilating chambers, a pressure main for the web drying and ventilating medium, and an exhaust main for said noxious gases, said mains constituting laterally spaced stress members for all of said press units and comprising separably connected sections whereby the press units may be connected up and disconnected at will, said duct containing members comprising hinged sections foldable in alternately opposite directions into compact formation for affording free access to the web.

10. In a supporting structure for a printing press comprising a plurality of separable press units for successive printings on a continuous web, the combination of a plurality of pairs of laterally spaced side frame sections for the respective press units provided with pressure mains and exhaust mains which constitute laterally spaced stress members for all of the press units and comprise separably connected sections whereby the press units may be connected up or disconnected at will, and duct containing members extending between opposite side frame sections of said press units and being provided with pressure and exhaust ducts associated with said pressure and exhaust mains and having discharge outlets and exhaust intakes presented toward the printed sections of the web.

11. In a rotary intaglio printing press comprising a plurality of serially arranged press units for successive printings on a continuous web, the combination with web printing and impression cylinders for said press units respectively, of spaced frames for said press units respectively, means for guiding a continuous web to and from said press units, transverse plates extending between said spaced frames and arranged substantially parallel with and on one side of the portion of the web leading from each printing unit, duct containing members movable between said side frames into and out of substantial parallelism with said transverse plates and disposed on the opposite side of the printed web for forming a drying chamber for the web and for conveying drying and ventilating medium to and noxious gases from the respective press units, a pressure main for the web drying and ventilating medium, and an exhaust main for said noxious gases, said mains constituting laterally spaced stress members for all of said press units and comprising separably connected sections whereby the press units may be connected up and disconnected at will.

12. In a rotary intaglio printing press comprising a plurality of serially arranged press units for successive printings on a continuous web, the combination with web printing and impression cylinders for said press units respectively, of spaced frames for said press units respectively, duct containing members movably mounted between said spaced frames for conveying web drying and ventilating medium to and noxious gases from the respective press units, pressure and exhaust mains associated with said frames and said duct containing members and constituting laterally spaced stress members for all of the press units and comprising separably connected sections whereby the press units may be connected up and disconnected at will, and means for moving said duct containing members.

13. In a rotary intaglio printing press, the combination comprising spaced side frames; a printing couple journalled about parallel axes transverse to said side frames; a web delivery roller for guiding a continuous web in a predetermined path from said printing couple; a transverse plate extending between said side frames from said web delivery roller to said printing couple and disposed in said predetermined path on one side of the web; a duct containing member disposed in said predetermined path on the other side of said web and extending from said web delivery roller to said printing couple for conveying a web drying and ventilating medium to and noxious gases from said predetermined path, said duct-containing member being movable, without disturbing the web, about the axis of said delivery roller to a position away from said web so as to permit access to said web and the printing couple; a pressure main for said web drying and ventilating medium; and an exhaust main for said noxious gases, said duct-containing member with said transverse plate forming an extended drying chamber into which the web may pass substantially immediately after printing.

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