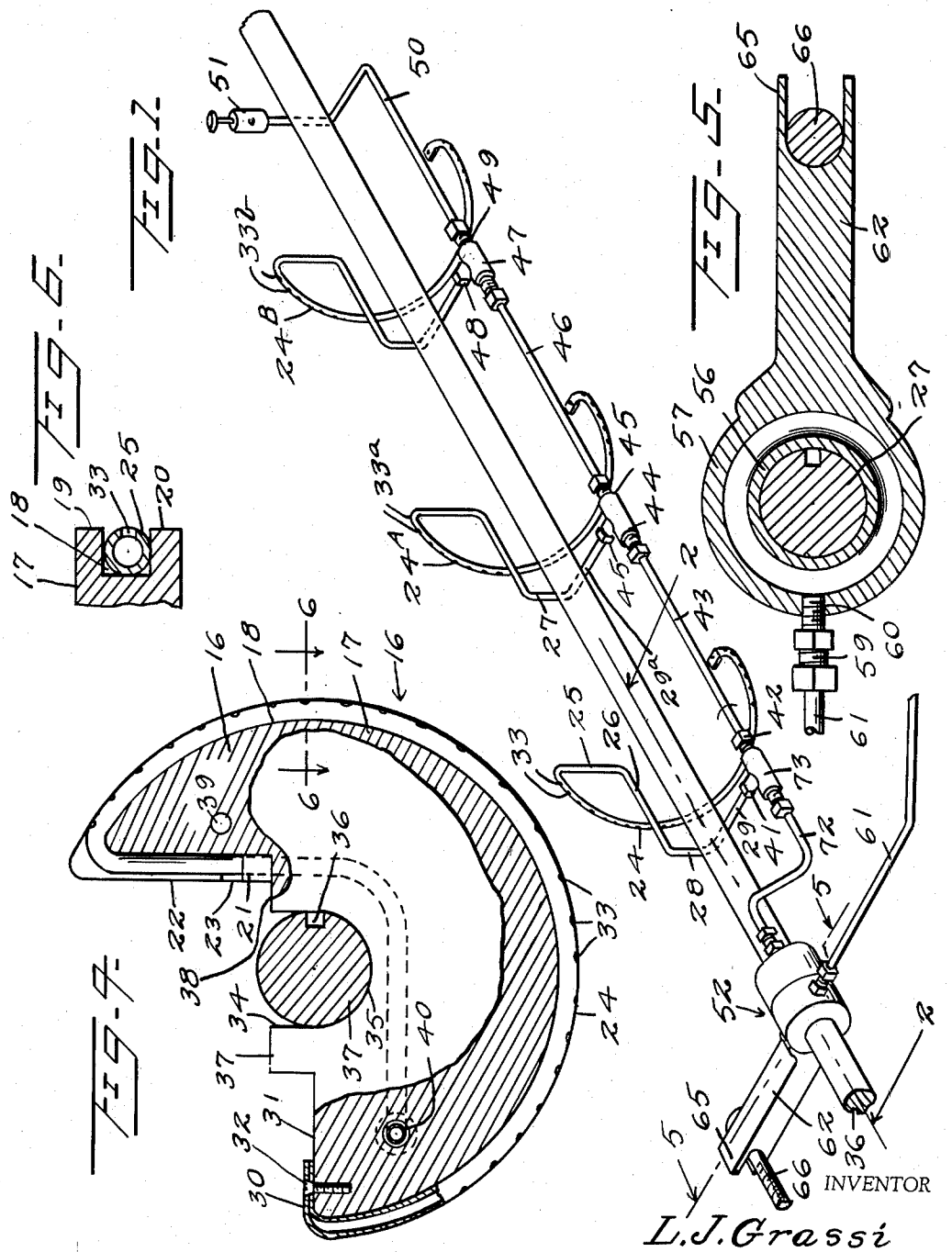
Jan. 17, 1956 L. J. GRASSI 2,730,950

AIR PRESSURE SYSTEM FOR THE SKELETON WHEELS OF AN OFF-SET PRINTING PRESS

Filed July 26, 1954 2 Sheets-Sheet 1



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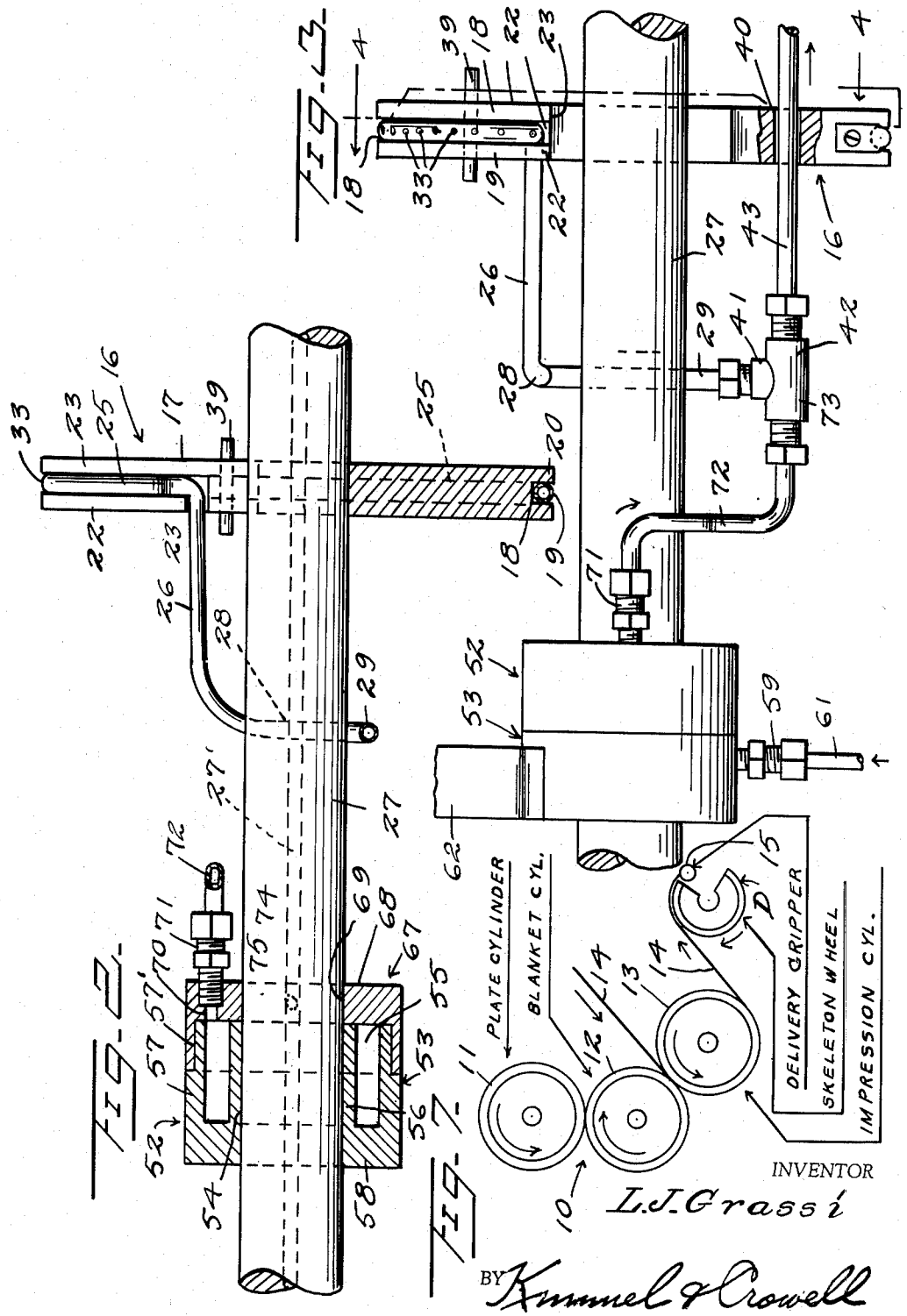
BY Kimmel & Crowell

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AIR PRESSURE SYSTEM FOR THE SKELETON WHEELS OF AN OFF-SET PRINTING PRESS

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8 Claims. (Cl. 101—420)

This invention relates to printing devices, and more specifically the invention pertains to an improvement in off-set printing presses.

It may be said that from the time of the conception of the off-set printing press, each of these machines which were adapted for commercial usage had inadvertently built therein a basic defect which, until the development of the present invention, defied all attempts of elimination. The fault or defect to which reference has been made arises at the sheet transfer mechanism on the delivery side of the press.

Every person skilled in this art is aware of the tendency of the skeleton wheels of an off-set printing press to cause streaking or lining of the printed side of a sheet. This difficulty reflects on the pride and reputation of every master printer and frequently results in financial loss in addition thereto. It should be recognized that a customer, in placing an order with a printer, anticipates that the work turned out will be substantially perfect. This too is the aim of the professional printer. However, in the event streaks or lines are present in the printed work, a downward adjustment of the price quoted to the customer is necessitated if the imperfect work is accepted, or it becomes a total loss if it is rejected by the customer.

Thus, one of the primary objects of this invention is to provide a skeleton wheel for an off-set printing press with means for positively preventing the streaking or lining of an impressed sheet after the sheet has been taken from the impression cylinder.

Another object of this invention is to provide a skeleton wheel of the type referred to above with means for preventing the sheet delivered to the discharge grippers from contacting the skeleton wheels during the period the sheet follows the orbit of the wheels.

A further object of this invention is to provide a skeleton wheel assembly for off-set printing presses, the assembly being provided with means for supplying a continuous fluid flow to the peripheries thereof to maintain a clearance between the skeleton wheels and the impressed sheet as the sheet travels around the orbit of the wheels.

A still further object of this invention is to provide a skeleton wheel assembly of an off-set printing press with means for continuously supplying to the periphery thereof a source of air under pressure as the impressed sheet is taken by the discharge grippers from the impression cylinder grippers to trace, without engaging the periphery of the wheels as the sheet is moved to the discharge end of the press.

Other and further objects and advantages of this invention will become more obvious from a consideration of the following specification when read in the light of the annexed drawings, in which:

Figure 1 is a perspective view of an air supply assembly for a plurality of skeleton wheels for an off-set printing press constructed in accordance with this invention and wherein, for the sake of clarity, the body portions of the wheels have been omitted.

Figure 2 is a partial side elevation of the system, partly in cross-section, taken on the horizontal plane of line 2—2 of Figure 1, and looking in the direction of the arrows.

Figure 3 is a top plan view of the partial assembly shown in Figure 2.

Figure 4 is a cross-sectional view, partly in elevation, of a skeleton wheel constructed according to this invention, the view being taken on the vertical plane of line 4—4 of Figure 3, and looking in the direction of the arrows.

Figure 5 is an enlarged detail cross-sectional view taken on the line 5—5 of Figure 1, and looking in the direction of the arrows.

Figure 6 is an enlarged detail partial cross-sectional view taken on the horizontal plane of line 6—6 of Figure 4.

Figure 7 is a basic schematic illustration showing the relative position of the skeleton wheel assembly with respect to the primary elements of a conventional off-set printing press.

Referring now more specifically to the drawings, reference numeral **10** designates, in general, a conventional off-set printing press (see Figure 7), wherein reference numeral **11** designates the plate cylinder which engages a blanket cylinder **12** that is, in turn, slightly spaced from the impression cylinder **13**. Suitable means (not shown) feed a continuous stream of paper sheets **14** between the blanket cylinder **12** and the impression cylinder **13** to receive the off-set impression. Gripper means (not shown) are positioned on the impression cylinder and retain the print sheet thereon until the sheet reaches the discharge side of the off-set press. At that time, a second set of grippers known as the discharge side grippers **15** engage the leading edge of the sheets **14** and carry the sheets **14** around the peripheries of the skeleton wheels **10**. After the sheets **14** have traveled the orbit of the skeleton wheels **10**, the grippers then convey the sheets to a discharge pile bed (not shown). This is the conventional operation of all off-set printing presses and it is the engagement of the sheets **14** with the skeleton wheels **10** that effects the streaking or lining of the printed sheets. The elimination of such lining or streaking is the end sought to be attained by the present invention, and a successful solution to this problem is achieved through an improvement in the conventional skeleton wheel assembly.

The reference numeral **16** designates, in general, a skeleton wheel constructed in accordance with the teachings of this invention. As is seen in Figures 2 to 4, inclusive, the skeleton wheel **16** comprises a substantially flat, arcuately shaped disc **17** having a peripheral groove **18** bounded at its opposite sides by the side walls **19** and **20**. One of the ends of the disc **17** is provided with a groove **21** defined by the side walls **22**, **23**, the open end of the groove **21** being in communication with the peripheral groove **18**. A notch or recess **23** extends inwardly from the side wall **22** adjacent the lower end thereof to serve a function to be described.

A length of pipe **24** is disposed within the peripheral groove **18** and has an extension **25** thereof positioned within the groove **21**. The extension **25** is bent laterally to pass through the slot **23** (see Figures 2 and 3) and continues in a portion **26** which is disposed substantially parallel to the longitudinal axis of the skeleton wheel shaft **27** supported for rotation in the opposite sides (not shown) of the printing press **10**. As is clearly seen in Figure 4, the portion **26** of the tube **24** is bent downwardly at **28** and is again bent in a direction prependicular to the longitudinal axis of the shaft **27** in order to form an end portion **29**.

The other end **30** of the tube **24** is crimped or sealed

and is secured to the other side **31** which serves to define the arcuate configuration of the disc **17**. In the present case, the securing means are illustrated as comprising a countersunk bolt **32**. As is seen in the drawings, each of tubes **24** is provided with a plurality of circumferentially spaced perforations **33** which communicate with the interior of the tube **24**.

The skeleton wheel **16** is provided with a substantially centrally disposed U-shaped opening **34**, the base **35** thereof being substantially semi-circular in order to receive the shaft **27** therein. Key means **36** serve to lock the wheel **16** for rotation with the shaft **27**. A conventional locking lug (not shown) extends across the plateaus **37**, **38** and the recess **34**, and has its bifurcated end engaging beneath the opposite end of the pin **39** which extends transversely of the disc **17** and projects from opposite sides thereof. Each of the discs **17** is provided with a transversely extending opening **40** to serve a purpose to be explained.

Reference is now made specifically to Figure 1 of the drawings wherein the skeleton wheel air supply system assembly is illustrated. As illustrated therein, it is seen that the open end **29** of the tube **24** is connected to the stem **41** of a T-connector and one of the arms **42** of the connector is connected to one end of a tubular conduit **43** which is passed through the opening **40** formed in the wheel **16**. The other end of the tube **43** is connected to one arm **44** of a second T-connector having its stem **45** connected with the open end **29***a* of a second length of tubing **24A**. The other arm **45** of the second T-connector is connected to one end of a second conduit **46** which projects through the opening **40** formed in a second skeleton wheel **16** (not shown). The other end of the conduit **46** connects with one of the arms **47** of a third T-connector, the latter having its stem **48** connected with the open end of the third tubular member **24B**, the other arm **49** of the third T-connector being connected to one end of a third tubular conduit **50** which extends through an opening **40** formed in the third of the skeleton wheels **16**. A manually operated bleeder valve **51** is connected to the other end of the conduit **50**.

Thus it is seen that as the shaft **27** is driven by the conventional driving means (not shown) the skeleton wheels **16** will also rotate and at the same time turn around the longitudinal axis of the shaft **27**, the conduits **43**, **46**, **50**, the T-connectors associated therewith, and the bleeder valve **51**.

A two-part air housing, denoted in general by the reference numeral **52**, is mounted on one end of the shaft **27**. One of the parts, **53**, comprises a substantially cylindrical member having a central bore **54** extending axially thereof to receive one end of the shaft **27** therethrough. One end of the part **53** is bored inwardly to provide an annular air chamber **55** defined by the inner and outer cylindrical walls **56**, **57** and the rear walls **58** extending therebetween. One end of an air inlet fitting **59** is threaded into an opening **60** (see Figure 5) formed in the cylindrical wall **57** and communicates with the chamber **55**. The other end of the fitting **59** is connected with a stationary source of air under pressure (not shown) through the conduit **61**. An arm member **62** is integrally formed with the cylindrical wall **57** and extends radially therefrom. The arm member is provided with a bifurcated outer end **65** which receives one end of a bolt **66** having its other end threaded into the inner side of one of the press side frame members (not shown). Thus it is seen that the member **53** is held against rotation with the shaft **27**.

The other part of the housing **52** comprises an elongated cylindircal member **67** having a pair of opposed open and closed ends. The closed end **68** is centrally apertured at **69** to receive the shaft **27** and the open end thereof is telescoped over the end **57'** adjacent the open end of the member **53**. As is seen in the drawings, the end **57'** is reduced in outside diameter to substantially equal the inside diameter of the member **67**.

The closed end **68** is transversely bored at **70** and communicates at its inner end with the chamber **55** while the other end thereof is threadedly connected with one end of a fitting **71**. The other end of the fitting **71** is connected to one end of a conduit **72** having its other end connected to the other end **73** of the first of the above described T-connectors.

The closed end **68** is provided with a threaded passage **74** which extends perpendicular to the axis of the shaft **27** and receives a set screw **75** which engages within the conventional keyway **27'** extending longitudinally of the shaft **27**.

From the above it is readily ascertainable that while the part **53** is fixed against rotation with the shaft **27**, the part **67** will rotate therewith and with the air assembly of the skeleton wheels **16**.

In operation, air is supplied under pressure to the chamber **55** through the conduit **61**. The air is discharged through the passage **70**, conduit **72** and enters the first of the T-connectors to conduit **43**, the second T-connector, conduit **46**, the third T-connector, and conduit **50** to the bleeder valve **51**. The tubular members **24**, **24A**, and **24B**, having their respective end portions **29**, **29***a* and **29***b* connected with the stems **41**, **45** and **48** of the T-connectors are also supplied with air which is discharged through the outlet ports **33**, **33***a* and **33***b*.

The air pressure is regulated at its source to provide a sufficient force at the discharge ports **33**, **33***a* and **33***b* whereby as the sheet **14** is engaged by the discharge side grippers **15**, the air striking against the sheet **14** will hold the sheet in spaced relation relative to the skeleton wheels **16** as the sheet follows their respective orbits to the discharge pile.

The bleeder valve **51** is adjusted to maintain a flow of air through the openings **33** of each skeleton wheel **16** at substantially equal pressure of between 10 and 25 pounds, depending on the weight of an individual sheet **14**.

The shaft **27** is standard and is formed of steel machined to a very smooth finish. The two part housing **52** is formed of aluminum and the bore **54** is machined to a tolerance of +0.002 of an inch relative to the diameter of the shaft **27**. The bore **69** is substantially equal to the diameter of the shaft **27**. The inside diameter of the cylindrical wall **67'** and the outer surface of the end wall **57'** are also machine finished. The inside diameter of the wall **67'** is permitted a tolerance of +0.002 inch.

Having described and illustrated one embodiment of this invention in detail, it is to be understood that the same is offered by way of example, and that the invention is to be limited only by the scope of the following claims.

What is claimed is:

1. A skeleton wheel for an off-set printing press comprising a substantially flat arcuately shaped disc having a centrally positioned opening formed therein, said disc having a peripheral groove formed therein communicating at one of its ends with a groove extending along one of the sides defining the arc, an elongated substantially hollow cylindrical tube disposed in said peripheral groove and having a portion thereof extending into said groove formed in said side, said portion of said tube having an end section projecting laterally with respect to a side of said disc and connected with a source of air under pressure, the other end of said tubular member being closed, means for securing said tubular member in said grooves, and a plurality of spaced air outlet ports extending transversely through the wall of that part of the tubular member disposed in said peripheral groove.

2. In combination with an off-set printing press of the type having a plate cylinder, a blanket cylinder, an impression cylinder, a shaft mounted parallel to and on the delivery side of said impression cylinder, a plurality of spaced skeleton wheels mounted on said shaft and adapted to rotate therewith, each of said wheels comprising a substantially flat arcuately shaped disc having a centrally positioned shaft receiving opening formed therein, said

disc having a peripheral groove formed therein having an end thereof communicating with one end of a groove formed in and extending along one of the sides of the disc which defines the arc, an elongated substantially hollow tubular member having an open and a closed end disposed in said peripheral groove and having a portion thereof extending into said groove formed in said side, said portion of said tubular member disposed in said side groove having a laterally projecting section including said open end, said disc having a second opening extending transversely thereof adjacent the other side thereof defining said arc, a second elongated substantially hollow tubular member having opposed open and closed ends, said second tubular member extending through said second openings in said disc, means connecting said open end of each of said first tubular members with said second tubular member and means connecting said open end of said second tubular member with a source of air under pressure.

3. In combination with an off-set printing press of the type having a plate cylinder, a blanket cylinder, an impression cylinder, a shaft mounted parallel to and on the delivery side of said impression cylinder, a plurality of spaced skeleton wheels mounted on said shaft and adapted to rotate therewith, each of said wheels comprising a substantially flat arcuately shaped disc having a centrally positioned shaft receiving opening formed therein, said disc having a peripheral groove formed therein having an end thereof communicating with one end of a groove formed in and extending along one of the sides of the disc which define the arc, an elongated substantially hollow tubular member having an open and a closed end disposed in said peripheral groove and having a portion thereof extending into said groove formed in said side, said portion of said tubular member disposed in said side groove having a laterally projecting section including said open end, said disc having a second opening extending transversely thereof adjacent the other side thereof defining said arc, a second elongated substantially hollow tubular member having opposed open ends, said second tubular member extending through said second openings in said disc, means connecting said open end of each of said first tubular members with said second tubular member, means connecting one end of said second tubular member with a source of air under pressure, and valve control means connected with the other end of said second tubular member.

4. Apparatus for supplying a fluid to an element rotatably mounted on a shaft comprising an elongated hollow cylindrical member having opposed open and closed ends, a substantially hollow cylindrical wall disposed within said cylindrical member and having an end thereof secured to said closed end of said member, said member and wall having a coaxial relation to define an annular chamber therebetween, a substantially hollow cylindrical closure member for the open end of said hollow cylindrical member, said closure member having opposed open and closed ends with said open end telescopically mounted over the open end of said cylindrical member, said closure member being rotatable relative to said cylindrical member, said closure member having an off-center opening forming a fluid outlet port extending transversely of its said closed end and in registry with said chamber, said opening upon rotation of said closure member tracing the open end of said chamber, said cylindrical member having an opening extending transversely therethrough and communicating with said chamber to form a fluid inlet port, said closed ends of said closure member and said cylindrical member having centrally formed openings therein, said centrally formed openings having a diameter substantially equal to the inner diameter of said cylindrical wall whereby said telescoped closure member and cylindrical member are adapted to be mounted on said shaft, means keying said closure member to said shaft for rotation therewith, fluid passage means connecting said outlet port with said element to be supplied, said means rotating with said element and said closure member, means retaining said cylindrical member against rotation, and means connecting said inlet port with a source of fluid under pressure.

5. Apparatus for supplying a fluid under pressure to a plurality of elements mounted on a shaft and rotatable therewith, said elements having at least one fluid discharge port therein, said apparatus comprising an elongated substantially hollow cylindrical member and a coaxially positioned inner cylindrical wall adapted for mounting on said shaft, a bridging wall connecting one end of said cylindrical wall with one end of said cylindrical member to define an annular chamber having opposed open and closed ends, said cylindrical wall having a fluid inlet port formed therein communicating with said chamber, means preventing said cylindrical member and cylindrical wall from rotating, a cylindrical closure member for said cylindrical member and cylindrical wall, said closure member having opposed open and closed ends and being telescopically mounted on said open end of said cylindrical member, and extending thereacross, said closed end of said closure member having a central opening formed therein to slidably receive said shaft therethrough, means keying said closure member to said shaft, said closed end of said closure member having an off-center opening formed therein in registry with said chamber whereby rotation of said closure member relative to said cylindrical member causes said last named opening to trace the outer open end of said chamber to form an air outlet port, fluid passage means connecting said outlet port with said elements and said discharge ports of said elements.

6. In combination with an off-set printing press of the type having a plate cylinder, a blanket cylinder, an impression cylinder, a shaft mounted parallel to and on the delivery side of said impression cylinder, a plurality of spaced skeleton wheels mounted on said shaft and adapted to rotate therewith, each of said wheels comprising a substantially flat arcuately shaped disc having a centrally positioned opening to receive said shaft thereto, means securing said disc to said shaft for rotation therewith, said disc having a peripheral groove formed therein having an end thereof communicating with one end of a second groove extending along one of the sides of said disc which define the arc, an elongated substantially hollow tubular member having an open and a closed end disposed in said peripheral groove and having a portion thereof extending into said groove formed in said side, said portion of said tubular member having a laterally projecting section including said open end of said tubular member, means connecting each of said open ends of said tubular members to a common conduit, fluid pressure control means mounted on one end of said conduit, means mounted on said shaft for supplying a source of fluid under pressure to the other end of said conduit, said means comprising a pair of coaxially spaced inner and outer substantially hollow cylindrical members connected adjacent one of their respective adjacent ends by a bridging wall and defining a substantially hollow annular chamber therebetween, said cylindrical members being mounted on said shaft in coaxial relation with said shaft rotatable in the inner tubular member, means connected with said outer cylindrical member to prevent rotation thereof, a fluid inlet port extending through said outer cylindrical member and communicating with said chamber, means connecting said inlet port with a source of fluid under pressure, an elongated substantially hollow cylindrical closure cap having opposed open and closed ends, said open end of said cap being telescoped over the open ends of said cylindrical members with said closed end of the former extending across the open ends of the latter, said closed end of said cap having a fluid outlet opening extending transversely thereof and in registry with said chamber whereby rotation of said cap

relative to said cylindrical members causes said fluid outlet to trace the open end of said chamber, means connecting the other end of said conduit with said fluid outlet, and means keying said closure means to said shaft for rotation therewith.

7. An article of manufacture comprising a first elongated substantially hollow cylindrical member having opposed open and closed ends, an endless wall extending axially of said cylindrical member and having a pair of opposed open ends with one of said last named ends secured to said closed end of said cylindrical member, means on said cylindrical member for fixedly mounting said cylindrical member on a support, a second cylindrical member having opposed open and closed ends, said second cylindrical member having the open end thereof telescopically mounted on said open end of said first cylindrical member with said closed end of said second cylindrical member extending across said open end of said first cylindrical member, said second cylindrical member being rotatable relative to said first cylindrical member, an opening extending through said first cylindrical member, said closed end of said second cylindrical member having an opening formed therein communicating with the space between said first cylindrical member and said endless wall, and means for connecting centrally said closed end of said second cylindrical member to a rotatable shaft.

8. An article of manufacture comprising an elongated hollow cylindrical member having an annular recess extending inwardly from one end thereof, said cylindrical member having a circular passageway extending coaxially thereof and concentrically with respect to said annular chamber, said cylinder wall having an opening extending therethrough and having the inner end thereof in open communication with said annular chamber, said opening comprising an air inlet port, an elongated arm having an end thereof fixedly secured to said cylindrical member adjacent the other end thereof, the other end of said arm terminating in a bifurcation, an elongated substantially hollow cylindrical closure member for said open end of said cylindrical member, said closure member having a pair of opposed open and closed ends, said closed end having an opening extending transversely therethrough and in communication with the open end of said annular chamber, said closed end having a centrally positioned aperture extending transversely therethrough having a diameter substantially equal to the diameter of said passageway, and said open end of said hollow cylindrical member being telescoped within the open end of said closure member.

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