Mar. 27, 1923.

1,450,022

J. E. DOYLE

REFLECTING HEAT APPLIANCE

Original Filed Oct. 15, 1921 6 sheets-sheet 1

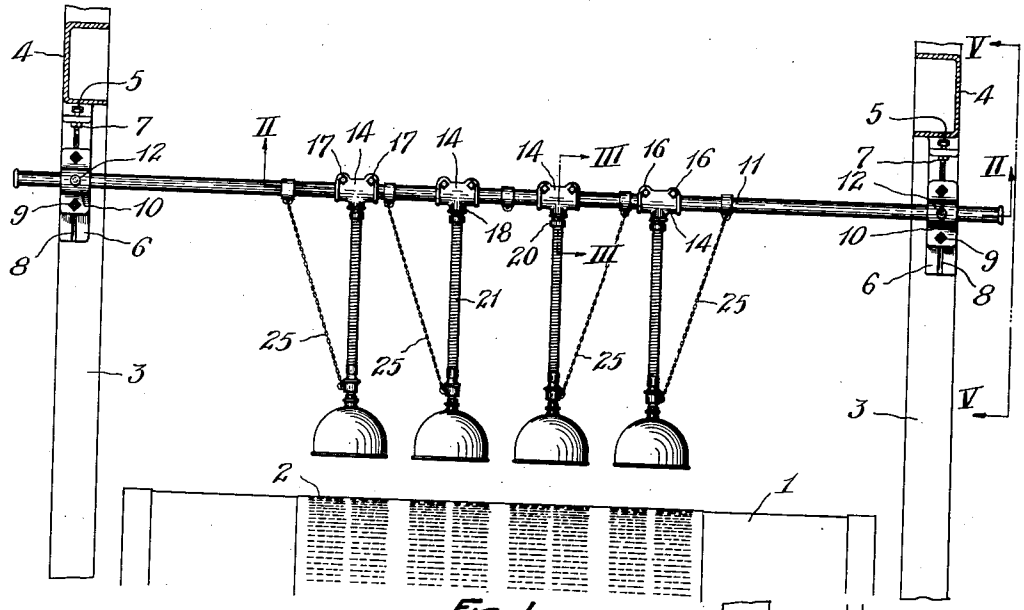


FIG. I.

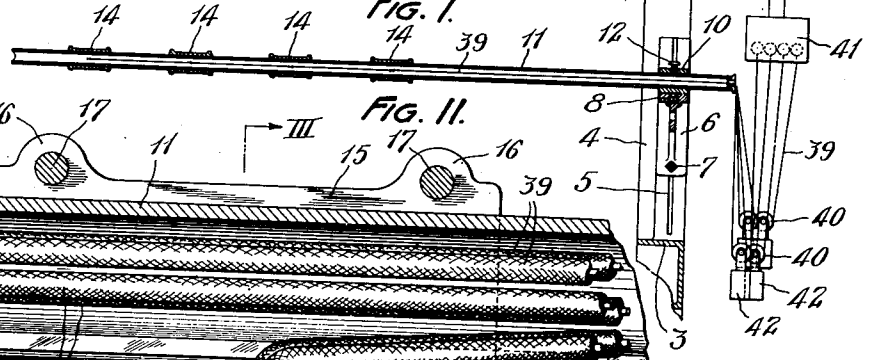


FIG. II.

FIG. IV.

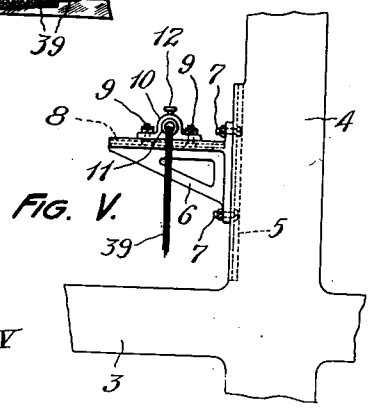


FIG. V.

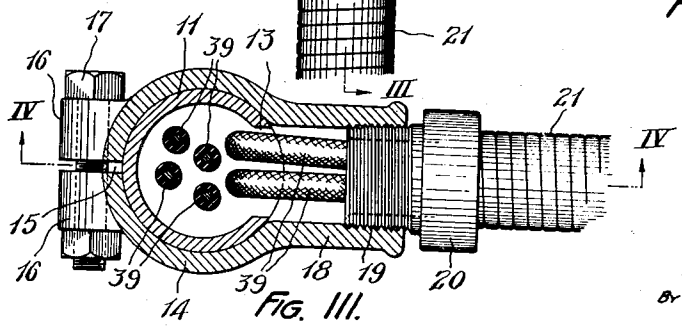


FIG. III.

INVENTOR:
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BY HIS ATT'Y.

Mar. 27, 1923.

1,450,022

J. E. DOYLE

REFLECTING HEAT APPLIANCE

Original Filed Oct. 15, 1921 6 sheets-sheet 2

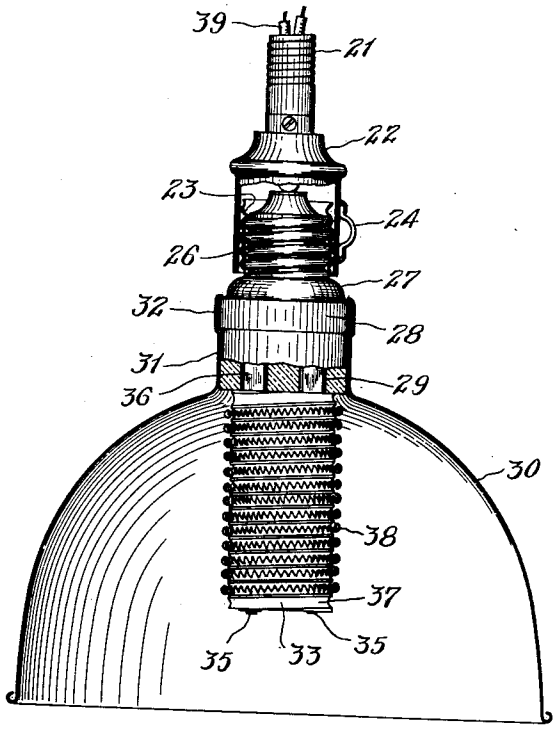


FIG. VI.

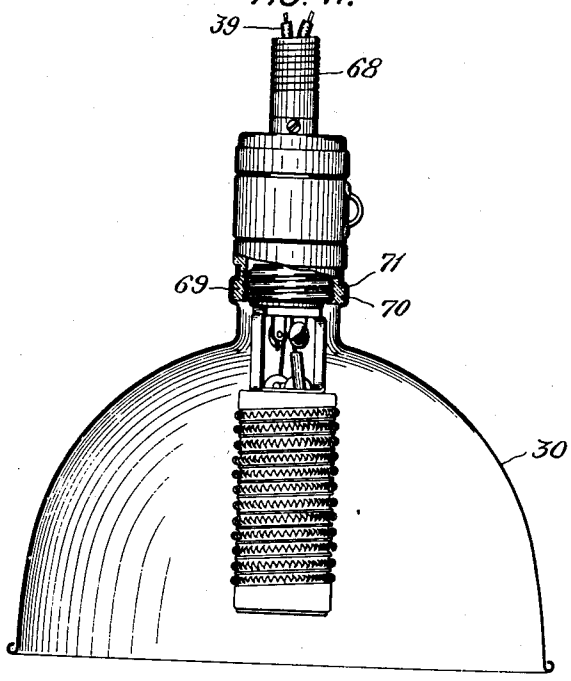


FIG. XVII.

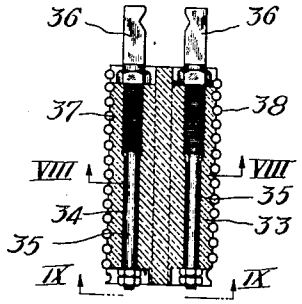


FIG. VII.

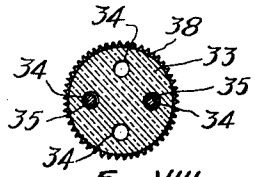


FIG. VIII.

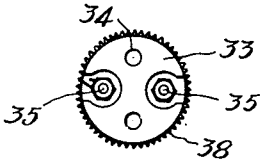


FIG. IX.

INVENTOR:
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BY HIS ATT'Y.
Ernest B. Mueller.

Mar. 27, 1923.

1,450,022

J. E. DOYLE

REFLECTING HEAT APPLIANCE

Original Filed Oct. 15, 1921 6 sheets-sheet 3

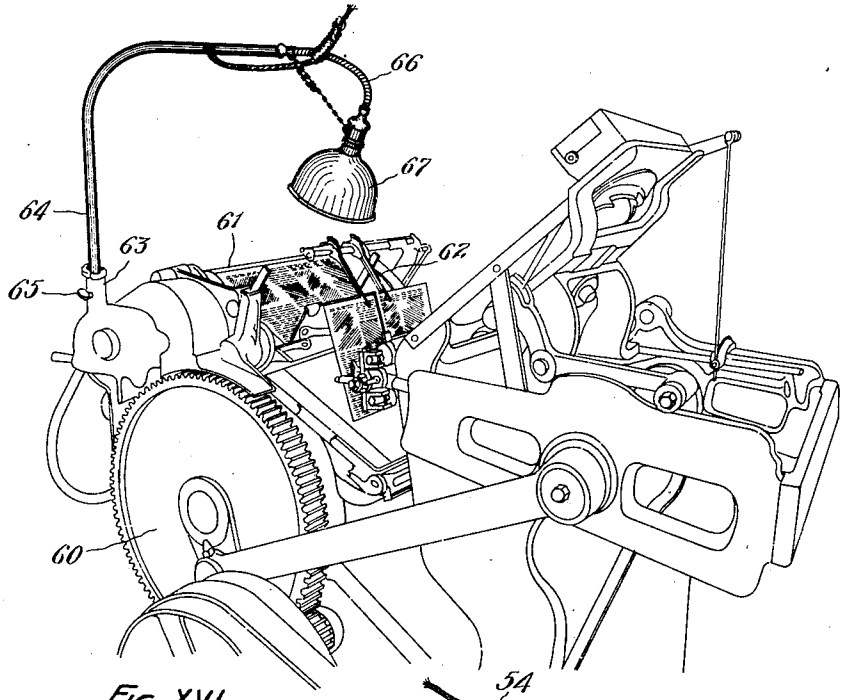


FIG. XVI.

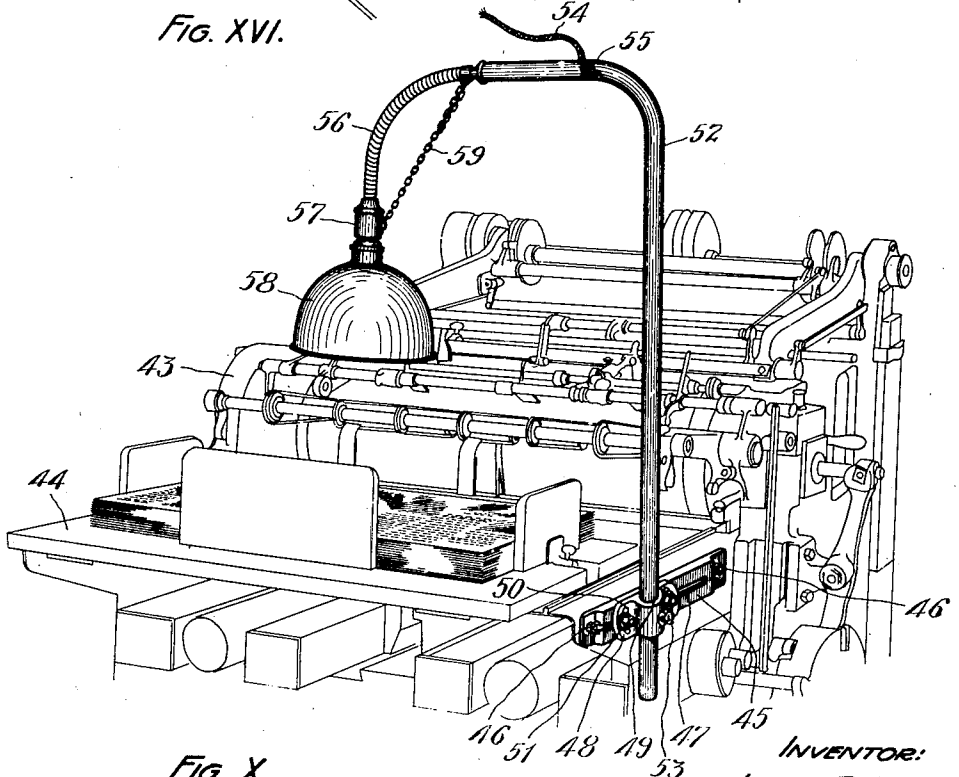


FIG. X.

INVENTOR:
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BY HIS ATT'Y.

Mar. 27, 1923.

1,450,022

J. E. DOYLE

REFLECTING HEAT APPLIANCE

Original Filed Oct. 15, 1921 6 sheets-sheet 4

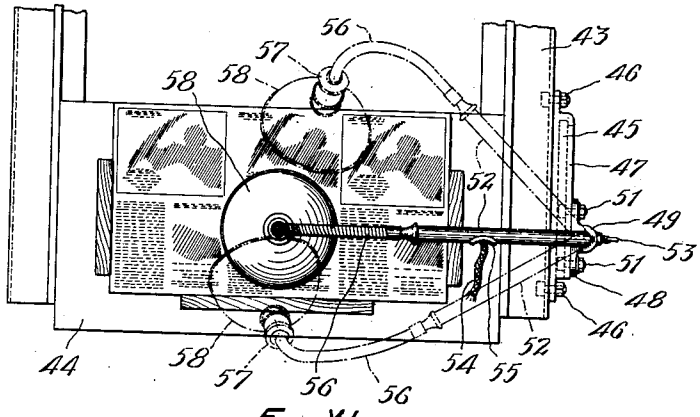
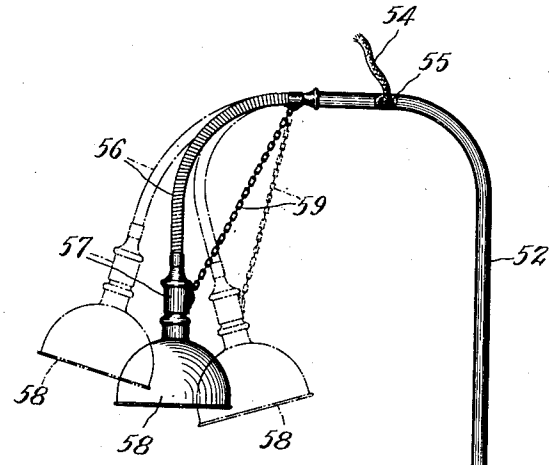


FIG. XI.



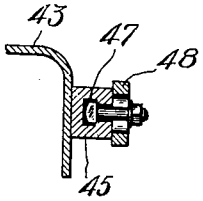


FIG. XIV.

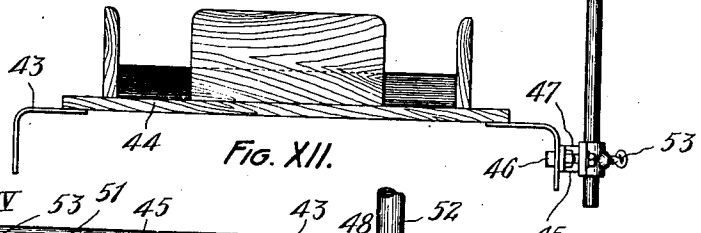


FIG. XII.

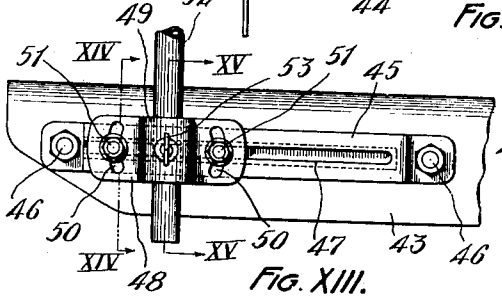


FIG. XIII.

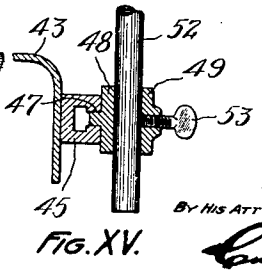


FIG. XV.

INVENTOR:
JAMES E. DOYLE
BY HIS ATT'Y.
Ernest B. Mueller.

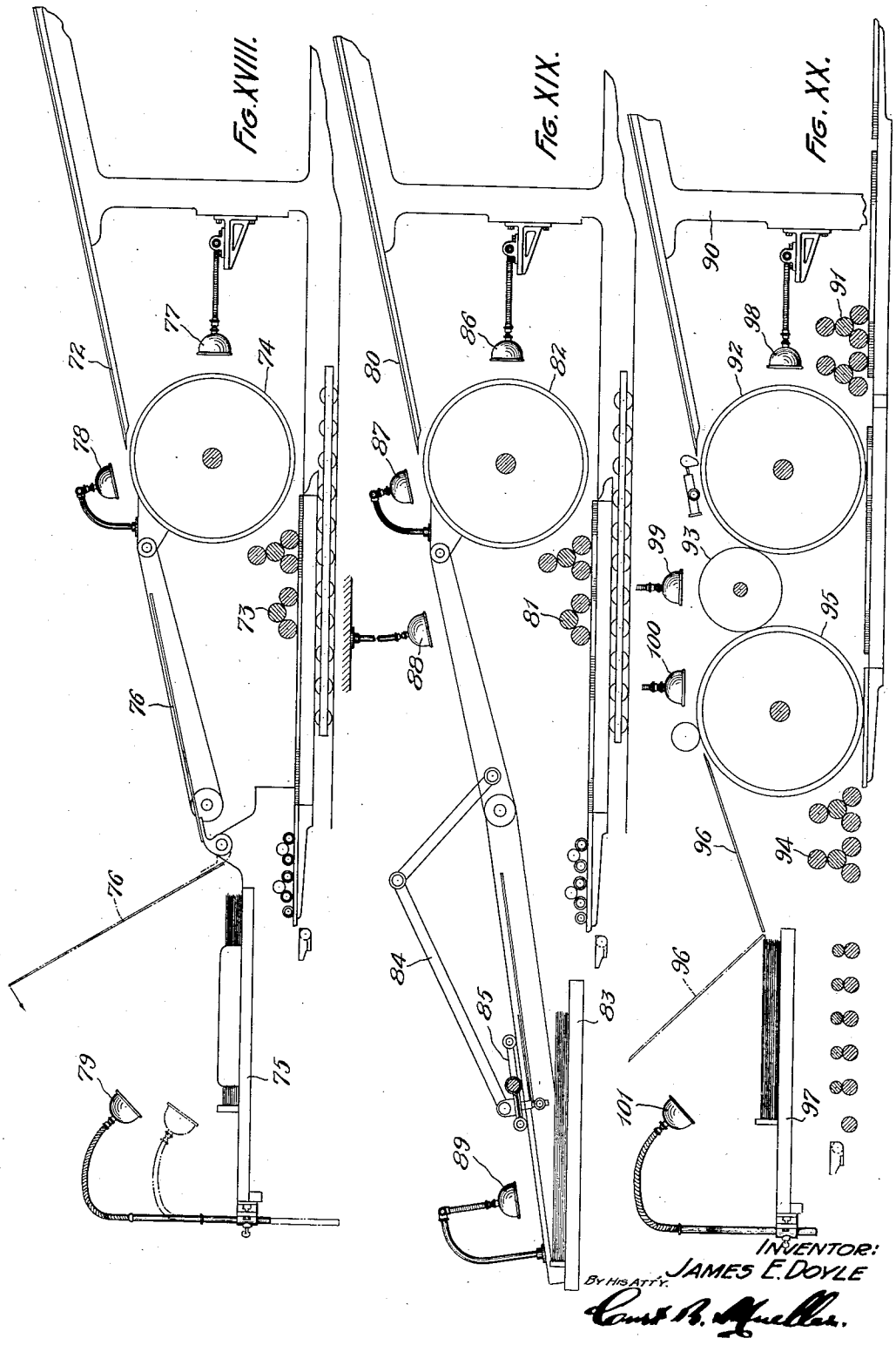
Mar. 27, 1923.

1,450,022

J. E. DOYLE

REFLECTING HEAT APPLIANCE

Original Filed Oct. 15, 1921 6 sheets-sheet 5



Mar. 27, 1923.

1,450,022

J. E. DOYLE

REFLECTING HEAT APPLIANCE

Original Filed Oct. 15, 1921 6 sheets-sheet 6

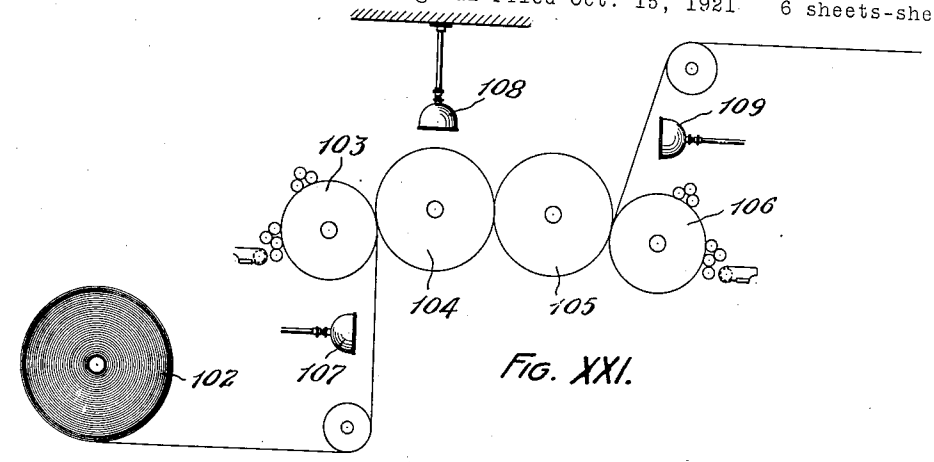


FIG. XXI.

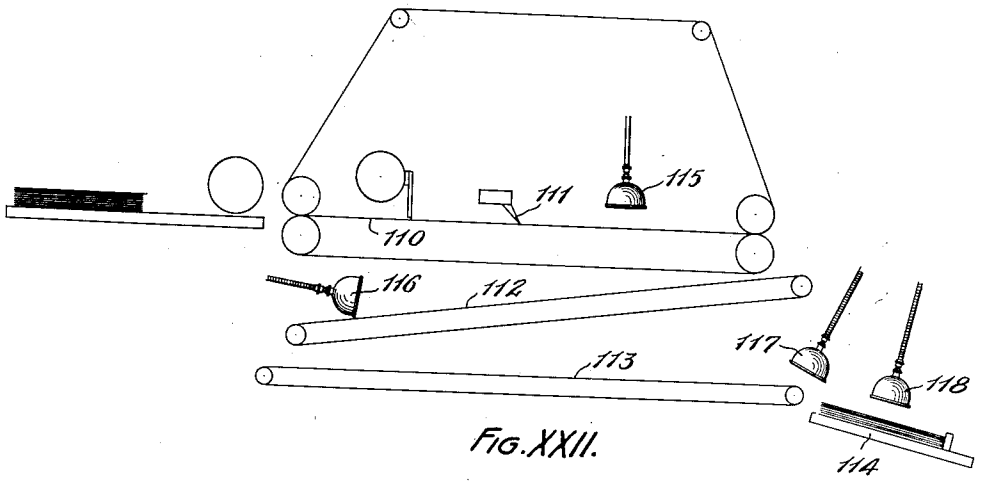


FIG. XXII.

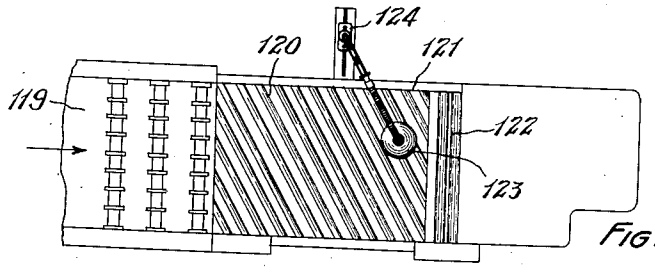


FIG. XXIII.

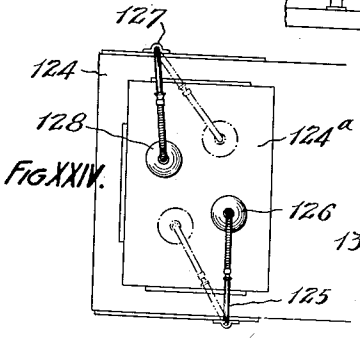


FIG. XXIV.

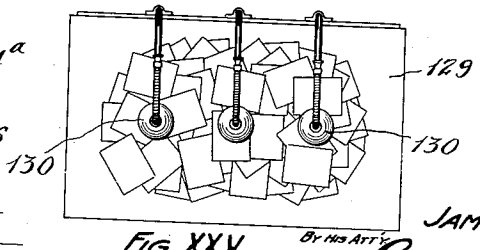


FIG. XXV.

INVENTOR:
JAMES E. DOYLE.

By his Atty.

Patented Mar. 27, 1923. 1,450,022

UNITED STATES PATENT OFFICE.

JAMES E. DOYLE, OF CLEVELAND, OHIO.

REFLECTING HEAT APPLIANCE.

Application filed October 15, 1921, Serial No. 507,931. Renewed November 16, 1922.

To all whom it may concern:

Be it known that I, JAMES E. DOYLE, a citizen of the United States, residing at Whittier Ave., Cleveland, in the State of Ohio and Cuyahoga County, have invented a new and useful Improvement in Reflecting Heat Appliances, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

This invention relates to a heater and the manner of adjustably mounting it upon a machine including a conveyor.

More particularly, the present invention is exemplified by a plurality of electrical heating units adapted when energized to present incandescent or glowing elements in effective proximity to material moved by said conveyor and which material it is desired to have pass through the heated zone. The drawings illustrate the practical application of my invention in various ways to different types of printing presses on which freshly printed paper sheets are transferred and the ink of which it is desired to dry to prevent offset besides removing the static electricity in the sheet. It should be understood that the use of the invention need not be restricted to printing machines nor to machines on which the traveling sheets are paper.

The object of my invention has been to design what may be termed a reflecting heater and employing an electrical unit efficiently located with respect to a reflector purposed to concentrate the heat in a prescribed direction. Frequently, a plurality or gang of reflecting heaters will be advantageous; but whether a single reflecting heater or a series of reflecting heaters are employed it is desirable to enable adjustment in diverse directions.

I am well acquainted with the development of this art, having already obtained several patents belonging to it and moreover, having several pending applications; in consequence of which I have necessarily become familiar with the disclosures of a number of prior patents, including, Hergesheimer No. 897,831, Daningburg No. 978,704, and Lane No. 991,860.

Specifically, my present invention discloses means for adjusting one or more heaters in right angularly related directions with respect to a conveyor, means for adjusting one or any desired number of heaters crosswise of the path of travel of a sheet drawn or carried by said conveyor, means for independently swinging any one or a plurality of heaters together about an axis and means including a universally movable connection enabling each reflecting heater to be not only adjusted in any conceivable direction but held in any chosen position of rest. Various details of construction of the mounting of the electrical heating unit and of the reflector connection are believed to embrace patentable novelty.

Adverting to the six sheets of drawings:

Figure I may be considered as a plan section of a portion of a printing press employing a printing cylinder upon which printed sheets are conveyed and showing as a plan view the mounting of a gang of reflecting heaters on a tubular carrier so that each heater may be universally adjusted with respect thereto whereas the carrier has adjustment in three directions.

Figure II is a section on line II—II of Figure I looking in the direction of the indicating arrows and showing in addition wire counterweighting means and a separate switch control for each heater.

Figure III is a section on line III—III of Figure IV.

Figure IV is a section on line IV—IV of Figure III.

Figure V is a fragmentary end view on line V—V of Figure I.

Figure VI is an enlarged detailed view partly in section of my preferred form of reflecting heater.

Figure VII is a longitudinal sectional view of the heating unit.

Figure VIII is a cross section on line VIII—VIII of Figure VII.

Figure IX is an end view of the heating element observed from line IX—IX shown in Figure VII.

Figure X is a modification in respect to the manner of mounting a single heater upon a Kelley type of press the upper portion of which appears in perspective.

Figure XI is a fragmentary plan view showing a single reflector over the delivery board of a Kelley press and showing in dotted lines two alternative positions of the heater support.

Figure XII is an end view of Figure XI.

Figure XIII is an enlarged broken detailed view of the adjustable mounting for the heater support shown in Figures XI and XII.

Figure XIV is a section on line XIV—XIV of Figure XIII.

Figure XV is a section on line XV—XV of Figure XIII.

Figure XVI is a perspective view of the upper part of a Gordon or "job" printing press equipped with a Miller feed and also with one of my reflecting heaters adjustably mounted thereon.

Figure XVII is a view corresponding to Figure VI showing a modified reflector attachment.

Figure XVIII is a diagrammatic view showing the application of my invention to a printing press employing a fly delivery.

Figure XIX is a diagrammatic view showing the plural application of my invention to a printing press using an extension delivery.

Figure XX is a diagrammatic view showing the mounting of my reflecting heater in a number of places on a two-color press.

Figure XXI is a diagrammatic view showing the application of a heater embodying my invention at different places on a rotary press.

Figure XXII is a diagrammatic view showing a series of my heaters effectively applied to a ruling machine.

Figure XXIII is a plan view of the feeder of a folding machine showing the use in conjunction therewith of my adjustable reflecting heater.

Figure XXIV is a diagrammatic view of a delivery board showing how two heaters, one at each side, can be arranged to dry any part of printed sheets.

Figure XXV is a plan view showing how a batch of printed sheets, scattered on a table to dry, may be more quickly dried by the employment of a series of my radiate reflecting heaters.

Traveling on a cylindrical conveyor 1 are freshly printed sheets 2. Standards at opposite ends of a printing press include each a horizontal portion 3 and an upright portion 4, the latter having an edge fashioned with a channel 5. The two portions 4 are each to carry a bracket 6 vertically adjustable therealong by means of bolt and nut combinations 7. The heads of the bolts are shown fitted within the channels 5 so as to be incapable of dislodgment in a direction perpendicular to the portions 4. Inasmuch as nothing is claimed for this common form of adjustable connection by itself, the cursory description furnished should suffice. The upper part of the two brackets 6 are each similarly fashioned with undercut channels 8 for the reception of the heads of a pair of bolt and nut combinations 9 which enable hangers 10 fashioned with bearings in middle portions to be adjusted horizontally along the channels 8. Extending between and projecting through the bearing portions of the hangers 10 is a hollow carrier or tube 11. The arrangement is such that the tube 11 may be turned or slid in an axial direction and secured in any desired position by means of the set screws 12 which pass through the tops of the hangers 10. Extending along the major portion of that side of the tube 11 which is nearest the conveyor 1, the tube 11 is slotted at 13 as most clearly appears in Figure III and the purpose of which will presently be explained. The possibility should now be apparent of adjusting the tube 11 in four distinct directions namely, by turning it, by moving it axially or crosswise of the path of travel of the sheets 2 on the conveyor 1, by actuating it toward and away from the conveyor 1 when the hangers 10 are loosened and by shifting it in an up and down direction when the brackets 6 are loosened.

The mounting upon the tube 11 of each of the four reflecting heaters shown in Figure I being the same, only one need be described and accordingly the singular number will be employed. A clamp 14 fits around the tube 11 and on its one side is slotted at 15. Near each end of the slot 15 the clamp 14 carries a pair of bosses 16. Bolt and nut combinations 17 serve to draw the bosses 16 together to effect the clamping action whereby to fix the clamp in a predetermined position on the tube 11. The loosening of the clamp 14 will obviously permit it either to be slid along or swung around the tube 11. The clamp 14 is fashioned with a hollow lateral extension 18 internally threaded at 19 and adapted to afford communication through the slot 13. A hollow union 20 is screwed into the extension 18 and connects with a hollow well known goose-neck structure 21 which may be bent in any direction, and carries at its extremity a conventional type of electrical socket 22 provided interiorly with a screw threaded lining 23. I attach to one side of the socket 22 an eyelet 24 with which a chain 25 is connected, the free end of the chain being intended to be attached in any desired manner to an appropriately located fixture for the purpose of affording additional means for holding the socket 22 in some predetermined position of adjustment.

A complementarily threaded shell 26 is adapted for detachable electrical connection with the socket and includes an insulating extension 27 provided beyond the socket 22 with an annular rim or flange 28 and in its end with a pair of terminal sockets 29. Nothing being claimed for the manner in which electrical connection is effected up

through the sockets 29 because any well known arrangement will satisfy, further elucidation will be omitted. A reflector 30 of appropriate shape includes an annular collar 31 which according to one feature of my invention is machine spun as an intimate overlying unit at 32 around the flange 28 thereby quickly securely and neatly supporting the reflector.

The electrical heating unit properly includes a mainly cylindrical core 33 which should have the properties of an insulator with resistance against high temperature, toughness and insurance against fractures either due to sudden temperature changes or vibration or both simultaneously. To date, I have most successfully employed a lava. The core 33 is fashioned with a plurality and as shown with four equispaced bores 34 extending longitudinally from end to end, only two of the bores being occupied by electrical conductors 35 each projecting from the same end as a pair of flat terminals 36 adapted to be inserted in the sockets 29 and to be held in place therein with a yielding engagement common to the art. The cylindrical surface of the core 33 is fashioned with a helical groove 37 in which is wound an electrical heating element 38 having its ends detachably connected with the conductors 35. As designed, the coiled element 38 will attain a glowing heat or in other words will become incandescent when the heating unit is energized as will now be described. A pair of wires 39 are connected with the terminals in the socket 22 and passing upwardly through the goose-neck 21 and through the clamp 14 are then led through the tube 11 to emerge at one end thereof, after which they pass around the lower sides of a pair of sheaves 40 and thence to suitable switch controls 41 diagrammatically shown in Figure II. The wires 39 are held in tension by counterweights 42 suspended from the sheaves 40, so that the slack in the wires 39 will be taken up when the clamp 14 is adjusted along the tube 11. The provision of the slot 13 in the tube 11 enables the bends in the wires 39 where they pass through the extension 18 of the clamp to move along the slot 13 according to the adjustment movement which may be imparted to the clamp 14.

As will now be readily understood, depending upon the character of the printing job and the arrangement of the printed sheets 2 on the conveyor 1, the plurality of reflecting heaters may be set in innumerable positions of adjustment both with respect to the conveyor 1 and with respect to each other. Figure I happens to illustrate four heaters projected substantially horizontally from the tube 11 and at equal distances from each other for effective application of heat to what may be considered as either four freshly printed strips 2 or a sheet of paper with four printed areas in parallel strips. It might well be that starting with an equipment of four heaters, the extent of the printed area on a sheet or sheets, carried upon the conveyor 1 and measured in a direction across the route of travel or in a line substantially parallel to one drawn between the strands 4, will be so restricted as not to require the heat from say, one or both of the end heaters. In such event a ready control is afforded by means of a separate switch 41. Depending also upon the bulk of the inked impression a plurality of heaters might be arranged to concentrate their heat radiation upon some particular area of the passing sheet and this is clearly made possible by the manifold adjustments which I have provided.

The modification shown in Figures X to XV inclusive shows the mounting of one of my reflecting heaters upon a Kelley type of press 43 which is equipped with a delivery board 44 along one side of which a bracket 45 is mounted by means of fastening devices 46. The bracket 45 includes a horizontally extending slot 47 along which a clamp 48 with a middle bearing section 49 may be adjusted in a manner similar to that shown in Figures I and V. The clamp 48 is itself fashioned with a pair of arcuate slots 50 registering with the slot 47 such that when the fastening devices 51 are loosened the clamp 51 may be moved either along the slot 47 or turned with the limits afforded by the slots 50. A bent tube 52 is mounted for adjustment movement within the arched section 49 and is to be secured by means of a set screw 53. Lead wires 54 pass through a suitable opening 55 in the tube 52 thence through a goose-neck 56 and to a socket 57 carrying a reflector 58 and a heating unit (not shown). An adjustable chain length 59 connects the socket 57 with the rigid end of the goose-neck 56 to steady the heater against vibration. As is clearly shown by the alternative positions of the heater shown in dotted lines in Figures XI and XII the radiation of heat may be directed as may prove most effective to the last sheet deposited upon the pile of sheets on the delivery board 44.

The modification shown in Figure XVI shows the application of my invention to a Gordon or "job" press 60, which includes delivery or deposit shelf 61, transferring fingers 62 by means of which the printed sheets are successively removed from the platen and drawn over the shelf 61. Carried at one side of the shelf 61 is a socket 63 in which a bent tube 64 is fitted for up and down adjustment preparatory to being secured in some selected position by means of a set screw 65. A goose-neck 66 is connected with the end of the tube 64 and carries in-

side of a reflector 67 an electrical heating unit such as that shown in Figure VI. It will be manifest that the reflected heat may, by means of the construction shown, be radiated in any conceivable direction and more than that may have its location of inception adjusted toward or away from any section of the path of movement of the freshly printed paper sheet.

Figure XVII is a modification of the electrical heat reflecting unit in itself showing a portion 68 of the goose-neck connection from which is to be suspended a one-piece porcelain 69 including an annular rim 70 about which the neck 71 of a reflector is to be similarly spun. An electrical heating unit is then to be directly screwed into the socket 69 after the manner in which the shell 27 appears detachably connected with the socket 22 in Figure VI just above Figure XVII.

Figure XVIII is a diagrammatic view showing the application of a plurality of my variously adjustable reflecting heaters to a inking press 72 including printing rolls 73, a cylinder 74, a delivery table 75 and a fly delivery 76. Heaters 77, 78 and 79 are shown mounted so as to radiate heat to the side of the cylinder to the top of the cylinder and to the delivery board respectively. It is to be understood that adjustments of the heaters 77 and 78 may be accomplished similar to that shown in dotted lines in the case of the heater 79.

The diagrammatic view portrayed in Figure XIX shows a press 80 with inking rolls 81, cylinder table 82, delivery board 83 and an extension delivery 84 for actuating and conveying a sheet in a manner well known to the art. Heaters 86, 87, 88 and 89 are mounted for manifold adjustment at the side of the cylinder 82, above the latter, above the delivery tapes and above the delivery board respectively.

Figure XX shows the application of a series of heaters embodying my invention to a two-color press 90 comprising one set of inking rolls 91, a cylinder 92, a transfer cylinder 93, another set of inking rolls 94 and another cylinder 95 from which the paper sheet is conveyed by a fly delivery 96 to a table 97. A heater 98 is adjustably mounted to radiate its heat toward one side of the cylinder 92. A pair of heaters 99 and 100 are appropriately suspended above to radiate heat downwardly toward the transfer cylinder 93 and the printing cylinder 95 respectively. Another heater 101 is again shown mounted so as to be capable of reflecting heat downwardly to each sheet when deposited upon the table 97.

Figure XXI illustrates diagrammatically a rotary press equipped with a paper roll 102 to be printed between cylinders 103 and 104 and again between cylinders 105 and 106. Heaters 107, 108 and 109 are mounted to apply heat to the strip of paper before being printed and after each printing operation.

How my invention is equally feasible for use in conjunction with a ruling machine is revealed in Figure XXII, wherein appears diagrammatically a conveyor 110 and in operative proximity thereto one or more pens 111 intended to draw the ruled lines upon a paper sheet to be conveyed backwardly on a conveyor 112, thence to another conveyor 113 preparatory to delivery to a table 114. Heaters 115, 116, 117 and 118 are shown arranged to radiate heat, the first downwardly immediately after the ruling operation, the next laterally in opposition to the sheet moving upon the conveyor 112 and the last two just prior to delivery of the sheet to the table 114 and after the sheet has been deposited on each table.

In Figure XXIII appears a plan view of a folding machine including a feed table 119, oblique rollers 120 adapted to cause the traveling sheets to hug a lateral flange 121 so that all will be delivered to a folder 122. A heater 123 is adjustably mounted at 124 so that in addition to the adjustment enabled by its goose-neck connection, it may be swung around an arc over any desired series of the rollers 120 and incidentally at varying distances from the flange 121.

It may occasionally prove desirable to mount two adjustable heaters on opposite sides of a delivery board as is suggested in Figure XXIV where is shown a table 124 supporting a delivery 124^a. At one side of the board 124^a the table 124 has an adjustable mount for a bracket 125 carrying a heater 126. Similarly mounted upon the opposite side is a bracket 127 carrying a heater 128. The arrangement is such that the heaters 126 and 128 may be swung past each other as indicated in dotted lines.

The final view, namely Figure XXV, is a plan view showing a batch or indiscriminate pile of printed sheets scattered on the table 129 to dry, the drying operation to be hastened with a series of, in this instance three, reflecting heaters 130 which are to be understood as likewise adjustable in several directions.

I claim:—

1. The combination with a conveyor, of a gang of heaters arranged in effective proximity to said conveyor, said heaters being mounted for universal movement.

2. The combination with a conveyor for material to be heat treated, of a gang of heat reflecting devices arranged in effective proximity to material moved by said conveyor, each of said devices being independently mounted for universal movement.

3. An appliance of the character described comprising in combination a plurality of heaters, means for adjusting each heater by itself, and means for adjusting all the heaters together.

4. An appliance of the character described comprising a heater, an adjustable support, and an adjustable connection between said heater and support.

5. An appliance of the character described comprising a plurality of electric heaters, a support therefor, and means enabling adjustment of said heaters along said support.

6. An appliance of the character described comprising a plurality of heaters, a support therefor, and a connection between said heater and support enabling adjustment of said heaters both along and around said support.

7. An appliance of the character described comprising a heater, an adjustable support, and a connection between said heater and support enabling adjustment of said heater in a circular arc and axially, said support adjustment enabling an additional adjustment radial to said arc.

8. The combination with a sheet conveyor, of a universally movable heater.

9. The combination with a support, an electric heater, a reflector, and a connection for sustaining said heater and reflector at any chosen angle with respect to said support.

10. The combination with a support, a reflecting heater, between said heater and support enabling the former to reflect heat in any direction and to remain in any predetermined position of adjustment.

11. The combination of a sheet conveyor, a support, a heater, and a goose-neck connection between said heater and support enabling universal movement of the former with respect to the latter.

12. An appliance of the character described comprising a hollow support provided with a slot, an electric heater mounted for adjustment along said support, and lead wires within said tube and extending through said slot to said heater whereby to enable the desired adjustment along said support.

13. An appliance of the character described comprising an elongated tube provided along side with a slot, electric heaters mounted for adjustment along said tube, and pairs of lead wires within said tube and extending through said slot to said heater whereby to enable the desired adjustment along said support.

14. An appliance of the character described comprising an hollow support provided with a slot, an electric heater mounted for adjustment along said support, lead wires within said tube and extending through said slot to said heater whereby to enable the desired adjustment along said support and a counterweight for constantly maintaining said wires in tension.

15. An appliance of the character described comprising an elongated slotted tube, a clamp about said tube and adjustable therealong, said clamp having a lateral opening constantly in communication through the slot in said tube, an electric heater connected with said clamp and lead wires passing through the tube and said clamp opening to the heater.

16. An appliance of the character described comprising an elongated tube provided along side with a slot, clamps about said tube and adjustable therealong, said clamps having each a lateral opening constantly in communication through the slot in said tube, an electric heater connected with each of said clamps, pairs of lead wires passing through the tube and said clamp openings to the heaters respectively, and means for maintaining said wires in tension during adjustment of the clamps along said tube.

17. An appliance of the character described comprising a support, a hanger adjustable along said support, a carrier adjustable along said hanger, a clamp adjustably mounted on said carrier and a heater connected with said clamp.

18. An appliance of the character described comprising a support, a bracket adjustable along said support, hangers adjustable along said bracket, a carrier adjustable along said hangers, a clamp adjustably mounted on said carrier and a heater connected with said clamp.

19. An appliance of the character described comprising a support, a carrier adjustably mounted on said support, a clamp adjustably mounted on said carrier and a heater adjustably connected with said clamp.

20. An appliance of the character described comprising a support, a rod adjustably mounted on said support, a clamp adapted for sliding and turning adjustment on said rod and a heater flexibly connected with said clamp.

21. The combination with a conveyor, of a heater, means for adjusting said heater toward and away from said conveyor, means for adjusting said heater along said conveyor and means for swinging said heater about an axis.

22. The combination of a sheet conveyor, a plurality of heaters, means for simultaneously swinging said heaters about an axis, and means enabling one of said heaters independently of the rest.

23. The combination of a sheet conveyor, a plurality of heaters, means for simultaneously adjusting said heaters along said

conveyor, means for simultaneously swinging said heaters about an axis, and distinct means enabling all of said heaters to be either swung about or adjusted along an axis independently of each other.

24. The combination of a sheet conveyor, a plurality of electric heaters, means for simultaneously swinging said heaters about an axis, distinct means enabling all of said heaters to be either swung about or adjusted along an axis independently of each other and switches for controlling the energizing of each heater.

25. The combination of a sheet conveyor, a support, a plurality of electric heaters, means including clamps for adjustably connecting each heater with said support, lead wires for each heater and means for holding said wires in tension during the adjustment movement.

26. An appliance of the character described comprising a conveyor upon which sheets to be dried are to travel, a hollow support extending crosswise of said conveyor, an electric heating unit adjustably connected said support so as to be movable therealong, lead wires passing through said support and connected with said unit, and means for maintaining said wires in tension.

27. An appliance of the character described comprising a conveyor upon which sheets to be dried are to travel, a hollow support extending crosswise of said conveyor, a plurality of electric heating units adjustably connected with said support so as to be movable therealong, pairs of lead wires passing through said support and connected each pair with one of said units, means for maintaining said wires in tension and a switch control enabling any combination of units to be energized.

Signed by me this 8th day of October, 1921.

JAMES E. DOYLE.