June 26, 1928. 1,674,641

J. J. HALLIWELL

MATRIX DRYING PRESS

Filed Dec. 29, 1926 2 Sheets-Sheet 1

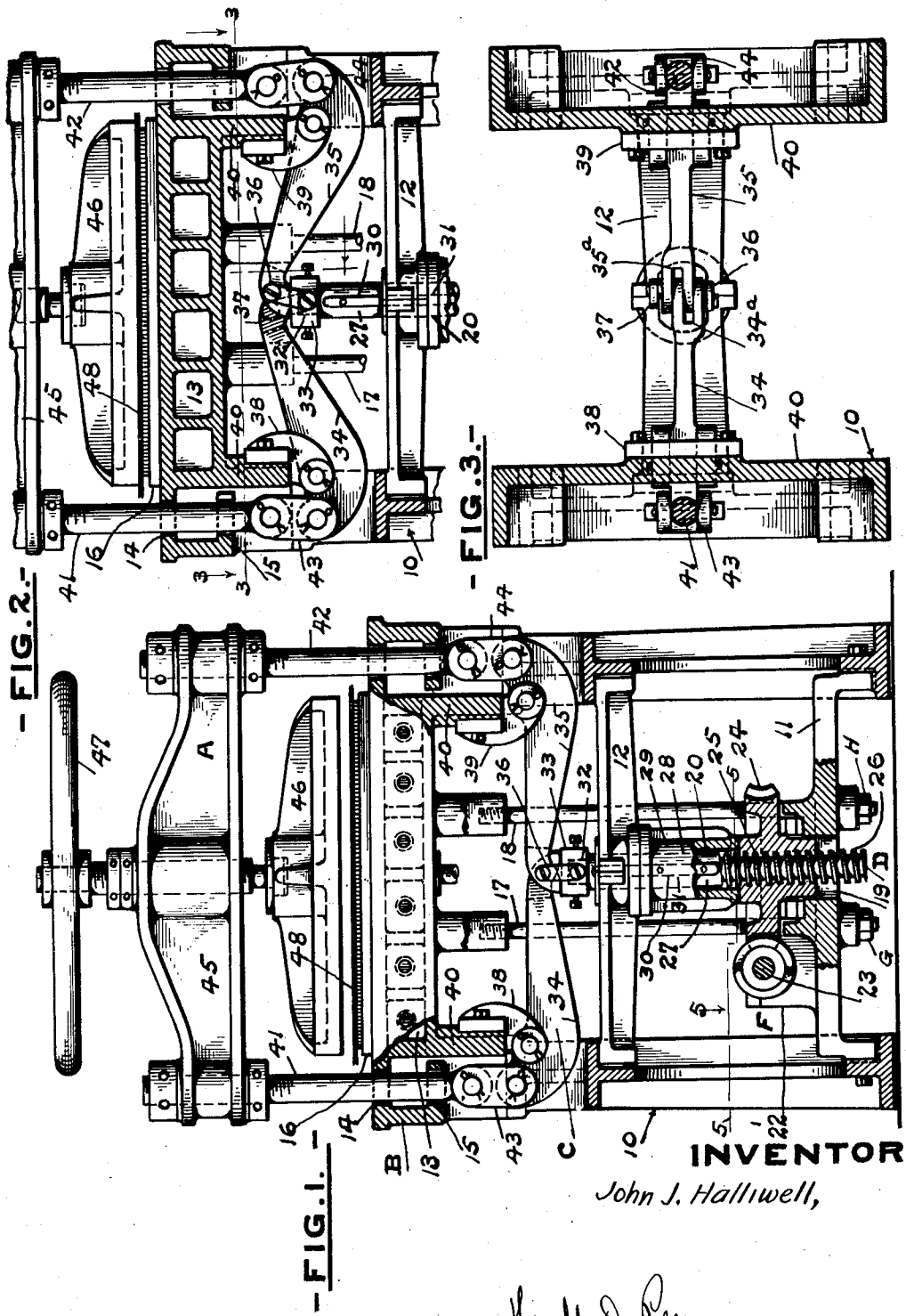


FIG. 2.

FIG. 3.

FIG. 1.

INVENTOR

John J. Halliwell,

Harold D. Penner, ATTY.

June 26, 1928. 1,674,641

J. J. HALLIWELL

MATRIX DRYING PRESS

Filed Dec. 29, 1926 2 Sheets-Sheet 2

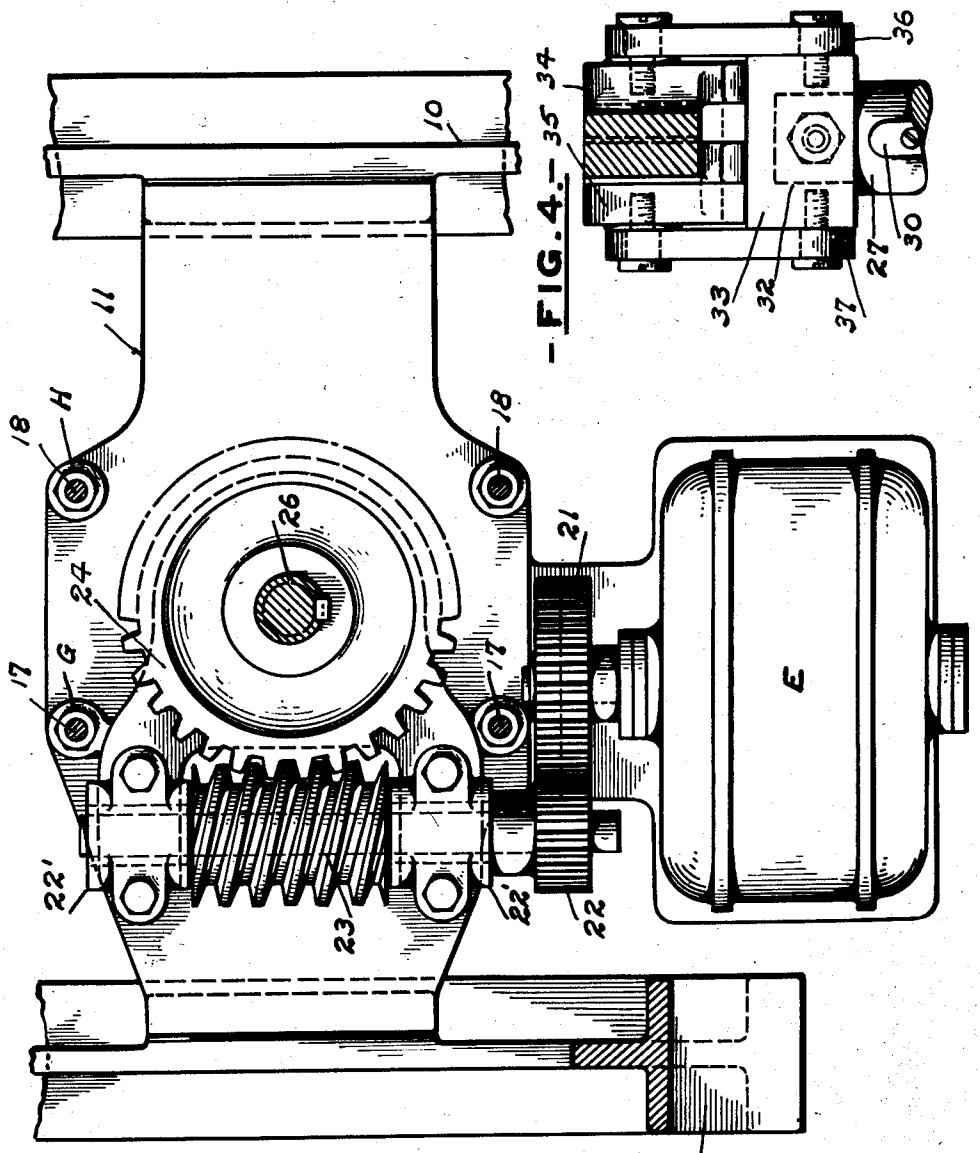



FIG. 5.




FIG. 4.

INVENTOR

John J. Halliwell,

Harold D. Penney, ATT'Y.

Patented June 26, 1928. 1,674,641

# UNITED STATES PATENT OFFICE.

JOHN J. HALLIWELL, OF TUCKAHOE, NEW YORK, ASSIGNOR TO R. HOE & CO. INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

## MATRIX-DRYING PRESS.

Application filed December 29, 1926. Serial No. 157,813.

The present invention relates to presses and particularly to presses for drying material under pressure, and more particularly the method of drying, mats or matrices such as are used for making stereotyped printing plates.

To obtain a perfect impression on the mat or matrix, which mat or matrix may be and usually is built up of layers of thin paper pasted together, it is requisite that the matrix should contain a certain amount of moisture while the impression is being made, and it is necessary to dry out this moisture before the matrix is used in a mold to cast the printing plate from which the printing is actually done, the function of the press herein described being to dry out such a matrix and maintain a constant pressure on the matrix during the period of drying.

A feature of the invention is the use, in a press, of a member for exerting pressure on a moist mat or matrix subjected to heat for drying, this pressure member being operated by compound lever and screw means actuated by an electric torque motor which will stall when maximum pressure of said member is reached and which motor at the time of stalling develops a continued power for actuating said means and whereby a constant pressure of said member is maintained on the mat or matrix irrespective of the effect of expansion of the metal parts of the press, or metal parts cooperating with the press, due to the heat; and the contraction or shrinkage of the mat or matrix due to drying of the moisture therein, the torque motor having the quality of "following up" for exerting maximum pressure through the pressure platens during contraction or shrinkage of the matrix through drying.

Referring to the drawings, Fig. 1 is a side view of the press partly in section.

Fig. 2 is a fragmentary view, partly in section showing the pressure member of the press moved to pressing position by the levers operated by the screw push rod.

Fig. 3 is a view of the press taken on the line 3—3 of Fig. 2 and seen from above.

Fig. 4 is a fragmentary detail view, partly in section, of an end of the levers, the connecting block, the links connected to ends of the levers and to said block, and the end of the push rod received in the connecting block, and

Fig. 5 is a fragmentary view of the press taken on the line 5—5 of Fig. 1, looking in the direction of the arrow and showing the motor, gears and worm shaft cooperating between the motor and the press mandrels.

Broadly described the invention includes the press mechanism generally denoted by A, the steam table or platen generally denoted by B, the lever mechanism generally denoted by C, the push member or rod D, the electric motor E, and the mechanism for reciprocatably moving the press mandrels generally denoted by F and cooperating between the push rod and the motor.

Referring to Fig. 1 there is provided a general two part supporting frame 10 having near its lower end the cross-piece 11 and having about midway of its height the cross-piece 12.

The frame 10 has at its upper end or top the heat table or platen B having the steam heating chambers 13 suitably connected to a supply of steam or other heating medium, not shown. The frame 10 extends horizontally outward at each end of the steam table B and forms end walls and top and bottom walls, the top and bottom walls having registering apertures 14—15 therethrough for receiving the pressure mandrels later mentioned.

The steam table B is provided on its top or upper surface with the platen 16, and has on its under side the four tension rods 17 and 18 threadedly secured to hub extensions 17′—18′ of the table at their upper ends and secured to the lower cross brace 11 at the lower ends by nuts G—H, Figs. 1 and 5, for contributing to resistance of pressure on the upper surface of the platen and table B.

The cross-brace 11 is provided midway of its length with the apertured hub 19 and the cross-brace 12 is provided with the apertured hub 20 in line with the hub 19 but having a smaller bore than the hub 19, the purpose of this being later stated.

The torque motor E, Fig. 5, which is substantially a plan view of the motor mounting, is operably supported adjacent to the cross-brace 11 for driving the mechanism F for reciprocating the push rod D, this mechanism including the motor mounted driving gear 21, which meshes with the pinion 22 fixed on one end of the primary drive shaft 23 mounted in bearings 22′ which are suitably mounted on the cross-brace 11.

The worm wheel 24, Fig. 5, is operably supported on the cross-brace 11 for engaging the worm shaft 23 to be driven thereby and is provided with a threaded secondary worm-shaft bore 25, Fig. 1.

The splined push rod D, Fig. 1, is threaded at its lower portion 26 for engaging the bore 25 of the worm wheel 24 and has an enlarged upper cylindrical portion 27 which is slidably mounted in the bore 28 of the hub 29 for operative movement, the hub 29 being secured to the cross-brace 12, and the splined push rod D being permitted vertical, non-rotative reciprocation by reason of the spline 30 engaging the splineway 31 in the hub 29. The upper portion 27 of the push rod D passes through the hub 29 and through the bore 20 in the cross-brace 12, the upper end of the push rod being rigidly received in a recess 32 of the shaft block 33, the lower free end of the push rod being movable in a hub 19 of the cross-brace 10.

The toggle-like pressure exerting lever mechanism C includes the compound lever arms 34 and 35, preferably of the shape shown in Figs. 1 and 3, having bifurcated inner ends $34^a$ and $35^a$, as seen in Figs. 3 and 4, interlockably engageable with each other and pivotally held in this relation by the links 36 and 37 respectively pivotally secured at one of their ends to the outer side faces of the shaft block 33 and at their opposite inner ends to the outer side faces of the bifurcated ends of the lever arms.

The compound lever arms 34 and 35 are pivotally supported near their outer ends by the brackets 38 and 39 which are secured to downward extensions 40 of the end walls of the steam table B. The compound lever arms 34 and 35 are further mounted at their outer ends to the press mandrels 41 and 42 by the links 43 and 44 respectively pivotally secured at one of their ends to an end of the lever arms and pivotally secured at their opposite ends to the adjacent ends of the press mandrels, these rods passing through the apertures 14—15 of the frame 10 and slidably movable therein, it being noted that the lever arms when actuated by the push rod D are toggle-like in their action for reciprocating the mandrels and associated press platen 46.

The platen press mechanism A includes said press mandrels which carry on their upper ends the supporting cross-piece 45 which carries, in a well known manner, the pressure member 46 operable by the hand wheel 47 for bringing the pressure member into initial contact, if desired, with the work on the platen 16.

In operation, the mat or matrix containing the moisture is extended on the platen 16 with the soft covering member or blanket 48 imposed thereon and the pressure member 46 is brought into contact with said blanket by operation of the wheel 47; heat being supplied to the steam table B and current supplied to the motor E, the push rod D will be moved upwardly by rotation of the worm wheel 24 and its appurtenant gearing, and pressure of the push rod will cause upward movement of the inner ends of the lever arms 34 and 35, whereby the outer ends of these arms are drawn downwardly and with them the mandrels 41 and 42 until maximum pressure of the member 46 and blanket 48 are applied to the matrix when the motor will stall and at the time of stalling will continue to exert power for maintaining continued pressure on the matrix.

The torque motor has the quality of following up the shrinkage of the matrix under the operation, for maintaining a uniform and continuous maximum pressure on the matrix irrespective of any change due to the expansion of the machine parts from heat or arising from contraction or shrinkage of the matrix due to drying of the moisture therein. It is important to maintain a uniform and continuous pressure on the matrix, for the reason that if such pressure is maintained the time required for drying the matrix is materially reduced.

What I claim and desire to protect by Letters Patent is:

1. A press for drying a matrix containing moisture said press including mechanism for exerting a continuous and uniform maximum pressure on the matrix, means for heating the matrix, mechanism including levers for operating said pressure mechanism, an electric torque motor, and mechanism cooperating between said motor and said operating mechanism for actuating the operating mechanism, whereby a continuous and uniform pressure is produced.

2. A press for drying a matrix containing moisture, said press including mechanism for exerting maximum pressure on the matrix, supporting means for the matrix, means for heating the matrix, toggle-like levers for operating said mechanism, an electric torque motor, and mechanism including a push member and a worm shaft and worm wheel cooperating between said motor and levers for actuating the levers, so as to create a continuous and uniform pressure on the matrix supporting means.

3. In a press for drying a matrix containing moisture, in combination, a frame, a steam table supported by said frame at the upper end of the frame, a platen on said table and heated thereby and adapted for superimposing the extended matrix thereon, press mandrels slidably supported at their lower ends by extended end portions of said table, a pressure member supported by said mandrels at the upper ends of the mandrels and movable thereby for exerting maximum pressure on said matrix when the same is

extended on said platen, lever arms pivotally supported near their outer ends on downwardly extending portions of said table and pivotally connected at their outer ends to the lower ends of said mandrels, the inner ends of said arms being pivotally connected to each other, a push rod pivotally connected at its upper end to the inner ends of said arms and having a threaded lower end portion engaging a threaded bore of a worm wheel for moving the push rod by rotation of said wheel, an electric torque motor disposed adjacent said frame, and a gear train cooperating between said motor and worm shaft, whereby a uniform and continuous pressure is produced on the matrix.

4. In a press of the character described, in combination, a pressure member, lever arms for operating said pressure member, a splined member for operating said lever arms and having a screw threaded portion, and means having female cooperation with said screw threaded portion and actuated by an electric torque motor for operating the last mentioned member, so as to produce a continuous and uniform movement in the said pressure member.

5. A matrix drying press, comprising a matrix supporting bed, means for heating said bed to dry the matrix, a pressure means adapted to exert a maximum pressure on the matrix on the bed, mechanism adapted to shift said pressure means relative to said bed actuated through gearing by an electric torque motor continuously developing constant power, means cooperating with said shifting and gear means whereby a continuous and uniform pressure is exerted between the said pressure means and the matrix bed irrespective of volume variations in the material of the press and matrix.

Signed at New York in the county of New York and State of New York this 24th day of December, A. D. 1926.

JOHN J. HALLIWELL.