

June 8, 1965

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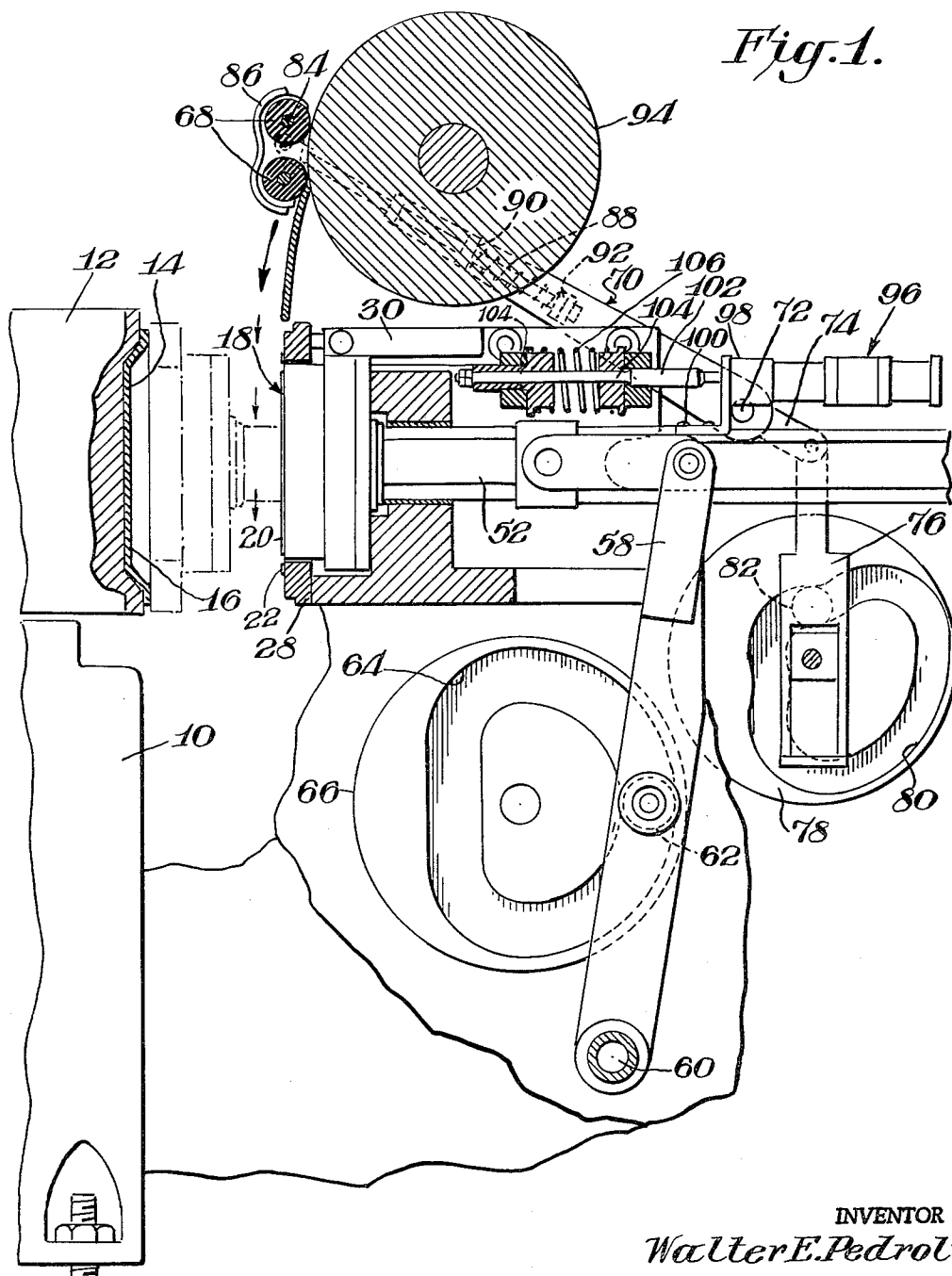
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SPECIAL PURPOSE PRESS FOR MARKING RELATIVELY INCLINED SURFACES

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4 Sheets-Sheet 1

Fig. 1.



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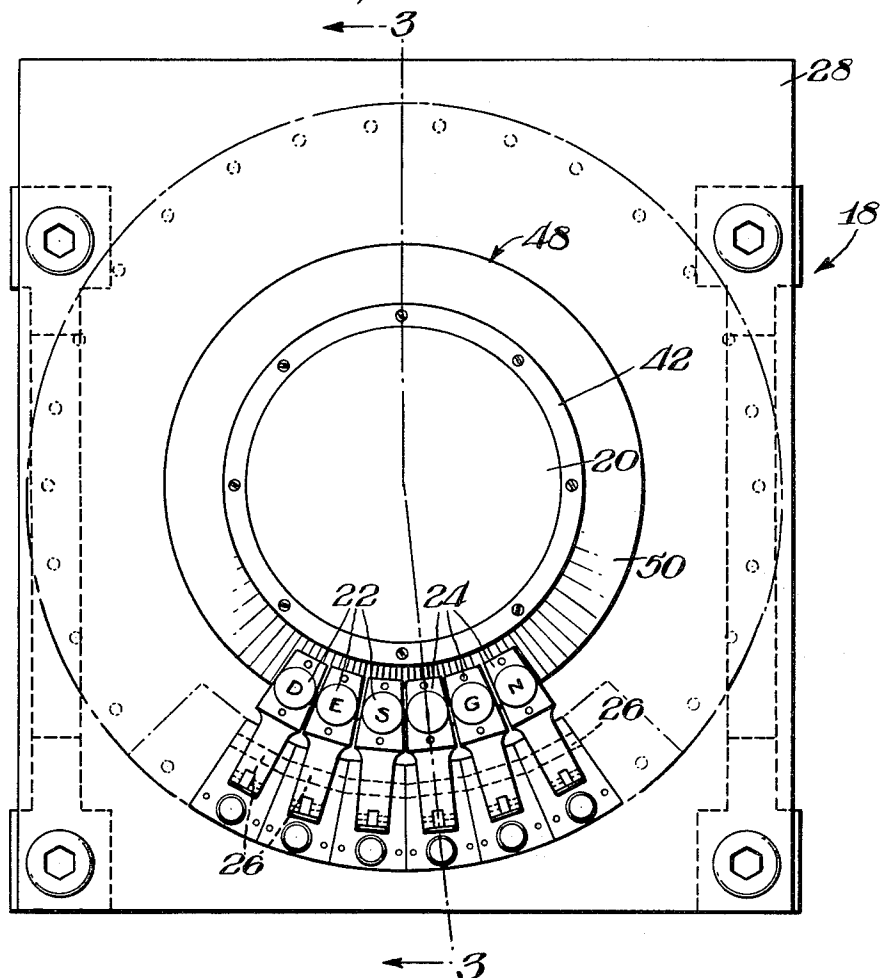
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Fig. 2.



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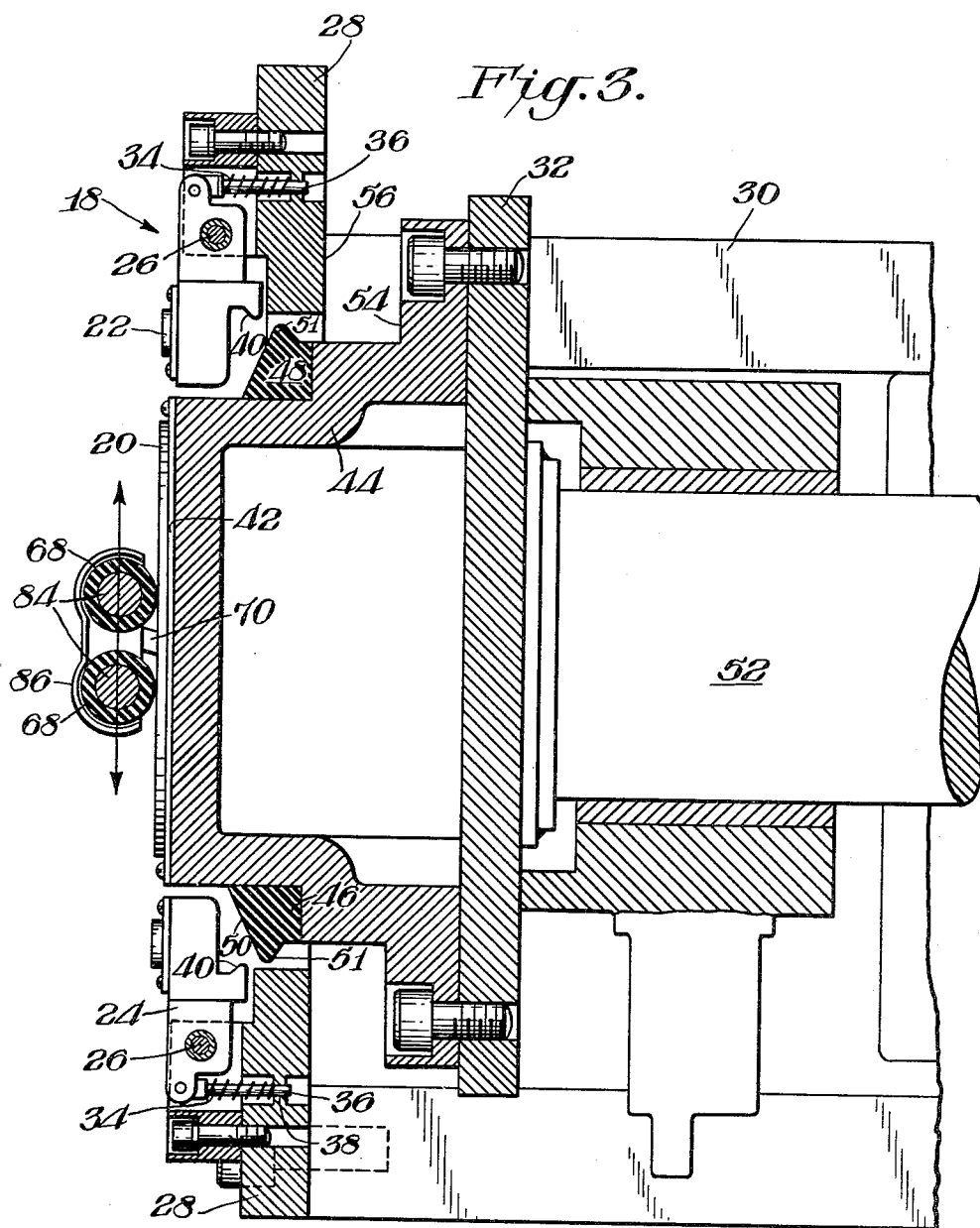
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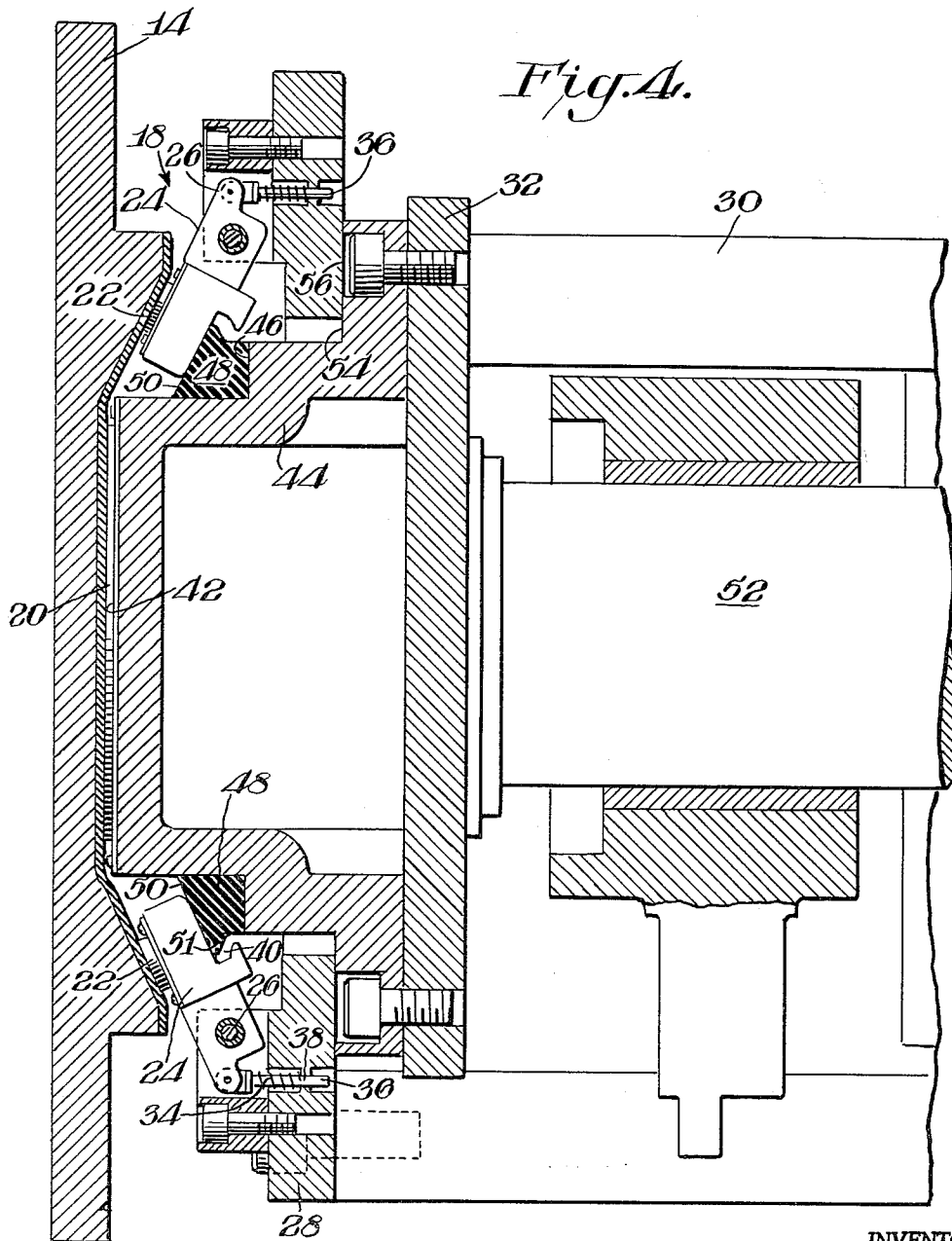
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SPECIAL PURPOSE PRESS FOR MARKING RELATIVELY INCLINED SURFACES

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4 Sheets-Sheet 4



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SPECIAL PURPOSE PRESS FOR MARKING RELATIVELY INCLINED SURFACES

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3 Claims. (Cl. 101-44)

This invention relates generally to a printing press, and more particularly to a special type of printing press adapted to print in a single operation on the face and rim of molded pulp paper articles such as paper plates, bowls, trays and the like.

Molded paper plates and the like are relatively inexpensive consumer items which have not been printed successfully heretofore. The result is that most of such items now on the market are plain. Printing on such items greatly improves their appearance. In order to keep the cost to the ultimate consumer at the necessary low figure which is required in order to be competitive, such items must be printed in large volume at high speeds by a machine that has a maximum of reliability with a minimum amount of handling.

In addition, prior machines designed to print on both the flat face or bottom as well as the inclined or offset flanged rim of molded pulp paper plates and the like in a single low-cost, high speed operation have not proved entirely satisfactory. The printing head must have plural, separate type faces inasmuch as there are plural irregular surfaces which are to be printed, and the plural type faces must be properly positioned with respect to the surfaces which they are to print at the time the printing ram reaches its outermost or printing position. An additional requirement is that at the time the printing ram is withdrawn, the type faces must be in a position for proper inking. Thus, at the time of printing, the type face must be in separate planes spaced from and inclined to each other an amount depending upon the depth and inclination of the pulp item which is to be printed.

Additionally, it is important that the type face which prints the inclined rim of such articles must be accurately positioned with precise concentricity with the type face which prints the bottom of the plate. This is particularly critical when several subsequent printing operations of multi-colors to form a unitary pattern are involved, as it will be appreciated that precision of shifting the rim printing type face determines whether the pattern is properly and accurately printed.

Accordingly, it is an object of the present invention to provide an automatic machine for printing on articles which accomplishes the foregoing requirements.

Another object of the present invention is to provide an automatic machine for printing in one operation on the flat base and inclined rim of pulp paper plates with mechanical accuracy in a high volume mass production environment.

Another object of the present invention is to provide an automatic machine for printing on irregular articles which includes plural type faces mechanically linked for accurate relative shifting in predetermined paths between a printing position and an inking position.

Another object of the present invention is to provide an automatic machine including a combined plate feeding and holding means and a printing head means which are relatively shiftable in conjunction with an inking means all operated in timed cyclical coordination to print plates having flat bottoms and inclined rims.

Other novel features and advantages of the present invention will become apparent to one skilled in the art from a reading of the following description in conjunc-

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tion with the accompanying drawings wherein similar reference characters refer to similar parts, and in which:

FIG. 1 is a fragmentary elevational view of the automatic machine of this invention with parts broken away to show certain elements in sectional elevation;

FIG. 2 is a fragmentary elevational view of the forward face of the printing head;

FIG. 3 is a sectional view on line 3—3 of FIG. 2 showing the pair of type faces in the inking position; and

FIG. 4 is a sectional view similar to FIG. 3 showing the pair of type faces in the printing position.

Referring to the drawings, the printing machine of this invention is of the type wherein a turret rotating in a horizontal plane about a vertical axis indexes pulp paper plates or other articles to be printed individually past a plurality of similar printing stations. Automatic loading and unloading means are associated with the turret to render the machine fully automatic. The turret comprises a series of plate holding means for positioning plates in vertical planes as well as indexing the plates past the printing stations. The various printing stations positioned around the turret may be similar in design, each for instance printing a different design with different colored ink. These main features of the overall automatic printing machine form no part of the present invention per se, and the description will not be burdened with a full disclosure thereof.

The plurality of printing stations may each comprise units duplicating the unit illustrated in the drawings. Such a unit includes a reciprocating printing head or ram for moving plural type faces into and out of printing contact with a plate supported on the holding means of the turret.

In more detail, the machine may comprise a base 10 mounting a turret 12 indexable in a horizontal plane about a vertical axis, not shown. At a number of positions around the edge of the turret 12 are work holding means 14 comprising a dished cavity fitting the bottom contour of a particular type of molded pulp plate which is to be printed upon. The plates 16 are held in the sockets 14 by any suitable means such as a vacuum suction device. The turret may be indexed intermittently through short steps of angular motion by rack and pinion, geneva, ring gear and pinion or other known indexing mechanisms powered by suitable electric or other type means, not shown, all as is well-known. The same electric or other type power means may operate gearing to drive groove cams at the plurality of similar printing stations, one of which will now be described in detail.

Each printing station includes a printing head or ram 18 which is shifted in a horizontal plane radially toward and from the axis of turret 12 to affect printing contact with a plate 16 in one of the sockets 14 of the turret. Such a printing head or ram 18 carries an inner type face 20 and an outer type face 22. The inner type face may have a generally circular boundary, as shown in FIG. 2, to fit the bottom portion of a plate 14. The outer type face 22 extends peripherally about the inner type face.

The outer type face may be composed of a number of sections positioned on a plurality of segments 24 each pivoted as at 26 to a flange member 28 secured to a slide 30 forming part of the printing head. The slide 30 is reciprocable radially of the axis of the turret 12 on the printing station frame. Each segment 24 includes a type face element 22 inwardly of the pivot point 26, and includes a spring 34 outwardly of the pivot point 26. Each spring 34 may be guided by a rod 36 reciprocable through an aperture 38 in the flange member 28. The springs 34 act in a direction to pivot the linkage or segment members 24 to a position, as shown in FIG. 3, wherein the type face segments 22 are aligned in a single vertical

plane. Each segment 24 further includes a radially inwardly projecting lip 40 on its rear face for a purpose later to be described. When the segments or linkages 24 are in their spring urged position as shown in FIG. 3, they are in what will be termed the inking position.

The inner type face 20 is rigidly mounted on the end 42 of a ram member 44 which faces the turret holding means 14. The ram member 44 is rigidly secured to a base plate 32, and is also mounted for reciprocation radially of the axis of the turret 12 on the printing station frame. An outwardly directed annular shoulder 46 on the ram serves as a support for a pressure member 48. The pressure member 48 extends in annular fashion around the forward portion of the ram member 44 and includes an inclined forward face 50 positioned to abut the rear sides of the pivoted linkage or segment members 24. The pressure member 50 further includes an outwardly extending rim 51 which cooperates in a manner described below with the projecting lips 40 of the pivoted linkage members 24. The pressure member 50 may be formed of resilient material to effect a cushioning action if desired or, on the other hand, may be fabricated of rigid material depending upon various factors such as the texture of the molded pulp article on which the printing is to be done.

The printing head 18 includes a lost motion connection between the flange member 28 secured to the slide member 30 and the base plate 32 secured to a powering ram 52. A shoulder abutment surface 54 on the ram member 44 is positioned to abut the rear surface 56 of the flange member 28 upon forward movement of the powering ram 52. The shoulders 46 and 54 are so positioned on the ram member 44 that the pressure member 50 will swing the linkage members 24 outwardly about their pivots 26 against the load of their individual springs 34 before the shoulder 54 contacts the rear surface 56 of the flange member. Thereafter, the flange member 28 attached to the slide 30 moves contemporaneously with the power ram 52 to a forward position for printing plates. When the outer type face segments 22 have been moved by the pressure member 50 to their outward position, the pair of type faces are in a relationship which will be referred to as the printing position.

An auxiliary cushioning mechanism is connected between the powering ram 52 and the slide 30 to prevent harmfully abrupt motion of the slide when the lost motion connection is taken up by the ram. Such a device may comprise a fluid dashpot cylinder and piston arrangement 96. A cylinder 98 is attached to the powering ram 52 at 100, and the rod 102 of the piston for the cylinder is resiliently connected at 104 with the slide 30 through spring 106. The rear end of the cylinder 98 includes a bleed orifice (not shown) for trapping fluid in the cylinder between the piston and the rear end of the cylinder in order that the slide 30 will begin its forward motion before shifting of the ram fully takes up the lost motion connection. An overload spring 106 is attached in case the fluid in the cylinder has not escaped by the time the outer type face contacts the plate. The ram then will be able to complete its stroke even though the inner type face will not be advanced far enough to print on the plate. This will prevent stalling or damaging the ram driving mechanism in the event of failure of proper cylinder operation.

The power ram member 52 is reciprocated by means of a lever 58 pivoted to the base of the machine at 60. The mid-portion of the lever 58 includes a roller type cam follower 62 which rides in a groove 64 of a rotary cam 66. The cam 66, as already noted, may be driven by suitable rotary drive mechanism, not shown, powered in synchronization with the turret indexing means. When the cam 66 and lever 58 have retracted the powering ram 52 so that the printing head 18 is in its retracted position, inking means may operate to coat the pair of type faces

20, 22 prior to the following forward reciprocation and printing operation.

Inking form rollers 68 are carried on the end of form roll arms 70 in the customary manner. Form roll arms 70 are pivoted about a pin 72 carried on a portion of the frame of the printing station. An extension 74 is pivotally connected to a slide member 76 which is in turn driven by a cam 78 including a groove 80 in which rides a follower 82 pivoted to the slide member 76. The cam 78 may also be rotatably driven by known mechanism in synchronization with the cam 66 and the index drive for the turret 12. Form rolls 68 are freely rotatable about their shafts 84 which are journaled in frame members 86 pivotally attached to the arm 70. The arm 70 telescopes by means of a spring 88 between collars 90 and 92, maintaining the form rollers 68 in contact with the ink distribution cylinder 94 and the type faces 20 and 22. Adjustable tracks (not shown) are provided for guiding the form rollers during their movement from the ink distribution roll to insure the proper degree of contact between the form rolls and the type faces, all as is well known.

In operation, the above described mechanism undergoes the following cycle of coordinated motion each time the turret 12 presents a fresh plate 16 to the printing station to be operated upon. First, under control of the printing head reciprocating cam 66, the power ram 52 which directly carries the inner type face 20 is moved forward. Forward motion of the ram 52 carries the cylinder 98 forwardly which imparts a somewhat slower forward motion to the slide 30 as a result of the dashpot effect caused by the bleed orifice at the rear of the cylinder 98. After a predetermined amount of forward shifting, the shoulder 50 of the pressure ring 48 engages the rear surfaces of the pivoted members 24 which carry the outer type face 22. Further movement of the ram 52 swings the pivoted members 24 forwardly against their individual spring loadings. When the outer type faces 22 have reached their desired angle of inclination relative to the inner type face 20, the shoulder 54 on the ram member 44 contacts the rear face of the flange plate 28 and thereafter moves the entire printing head consisting of the ram member 44 and the flange plate 28 forwardly as a unit. Continued forward motion of the printing head in the printing position brings it into printing contact with a plate 16 on the turret 12 to effect the desired printing operation.

On the return stroke, the outer annular rim 51 on the pressure member 48 engages the inwardly projecting lips 40 on each of the pivoted linkage members 24 as the ram moves ahead of the slide member 30. This insures that the pivoted linkage members 24 will be started on the return path toward their inking positions as biased by their individual light springs 34. As the ram 52 reaches the end of its retracting stroke to position the pair of type faces in the inking position, the auxiliary spring 106 insures that the lost motion connection between the ram and slide is opened up and the slide 30 is also in its fully retracted position. Spring 106 also provides for full retraction of the ram and inner type face 20 in the event that the cylinder becomes inoperative during the return stroke when the outer type is topped at the inking position by a stop on the frame. This prevents stalling press or damaging the print rolls in the event of failure of proper cylinder operation.

At this point, the cam 78 actuates the arm 70 to cause the inking rolls 68 to re-ink the pair of type faces in known manner. While the inking rolls are re-inking the type faces, the turret 12 indexes the printed plate away from the printing station and presents a fresh plate, to complete a machine cycle.

Thus, a printing head has been disclosed which positions a pair of type faces in alignment to be inked in a retracted position, and which positions the type faces in

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an angularly disposed arrangement for printing on irregular articles. The linkage mechanism which controls the relative shifting between the type faces insures that they maintain a desired predetermined relationship with mechanical accuracy throughout repeated cyclical operation of the machine.

While the above described embodiment constitutes a preferred mode of practicing the present invention, other arrangements may be resorted to within the scope of the actual invention, which is claimed as follows.

What is claimed is:

1. An automatic machine for printing on one surface of pulp paper plates of the type having a central base portion with an inclined rim portion therearound comprising a plate printing station including means connected to present plates seriatim and hold them during the printing operation with the surfaces to be printed exposed, a type face inking station including cylindrical roller means connected to traverse a type face and come to rest against a re-inking member, a printing head mounted for to-and-fro shifting motion along a predetermined path terminating at one end of the plate printing station and at the other end at the type face inking station, the printing head including a first type face for printing on the base of plates, a second type face for printing on the inclined rims of plates, means mounting the first type face in fixed relation on the printing head, means mounting the second type face for limited to-and-fro shifting motion relative to the printing head along a predetermined path terminating at one end in a printing position wherein the second type face is angled to the first type face to correspond with the inclination of plate rims and at the other end in an inking position wherein the second type face is aligned with the first type face to correspond with the traverse of the inking roller means, drive means connected to shift the printing head to-and-fro along its predetermined path in timed coordination with the presentation of plates at the printing station and to traverse the inking roller means across the type face in timed coordi-

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nation with the shifting of the printing head to the inking station, the drive means being connected to shift the second type face along its predetermined path between the printing position and the inking position in timed coordination with the shifting of the printing head, the drive means being arranged to insure that the second type face is in its printing position prior to the arrival of the printing head at the printing station whereby both type faces come into registry simultaneously with plate surfaces to be printed.

2. An automatic machine for printing pulp paper plates as in claim 1 wherein the drive means further includes a lost motion connection between the first type face and the second type face, primary abutment means arranged to shift the second type face through the lost motion connection in one direction along its predetermined path to the printing position, and yieldable biasing means arranged to shift the second type face through the lost motion connection in the other direction along its predetermined path to the inking position.

3. An automatic machine for printing pulp paper plates as in claim 2 wherein the drive means further includes secondary abutment means connected to assist the yieldable biasing means to positively shift the second type face out of the printing position.

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WILLIAM B. PENN, *Primary Examiner.*

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,187,666

June 8, 1965

Walter E. Pedroli

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 49, for "deescribed" read -- described --; column 3, line 65; and column 4, line 27, for "power", each occurrence, read -- powering --; column 4, line 60, for "vent" read -- event --; line 62, for "topped" read -- stopped --; line 63, after "stalling" insert -- the --; column 5, line 4, for "predeteremined" read -- predetermined --; line 19, strike out "a"; same column 5, line 22, for "of the" read -- at the --.

Signed and sealed this 26th day of October 1965.

SEAL)

Attest:

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Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents