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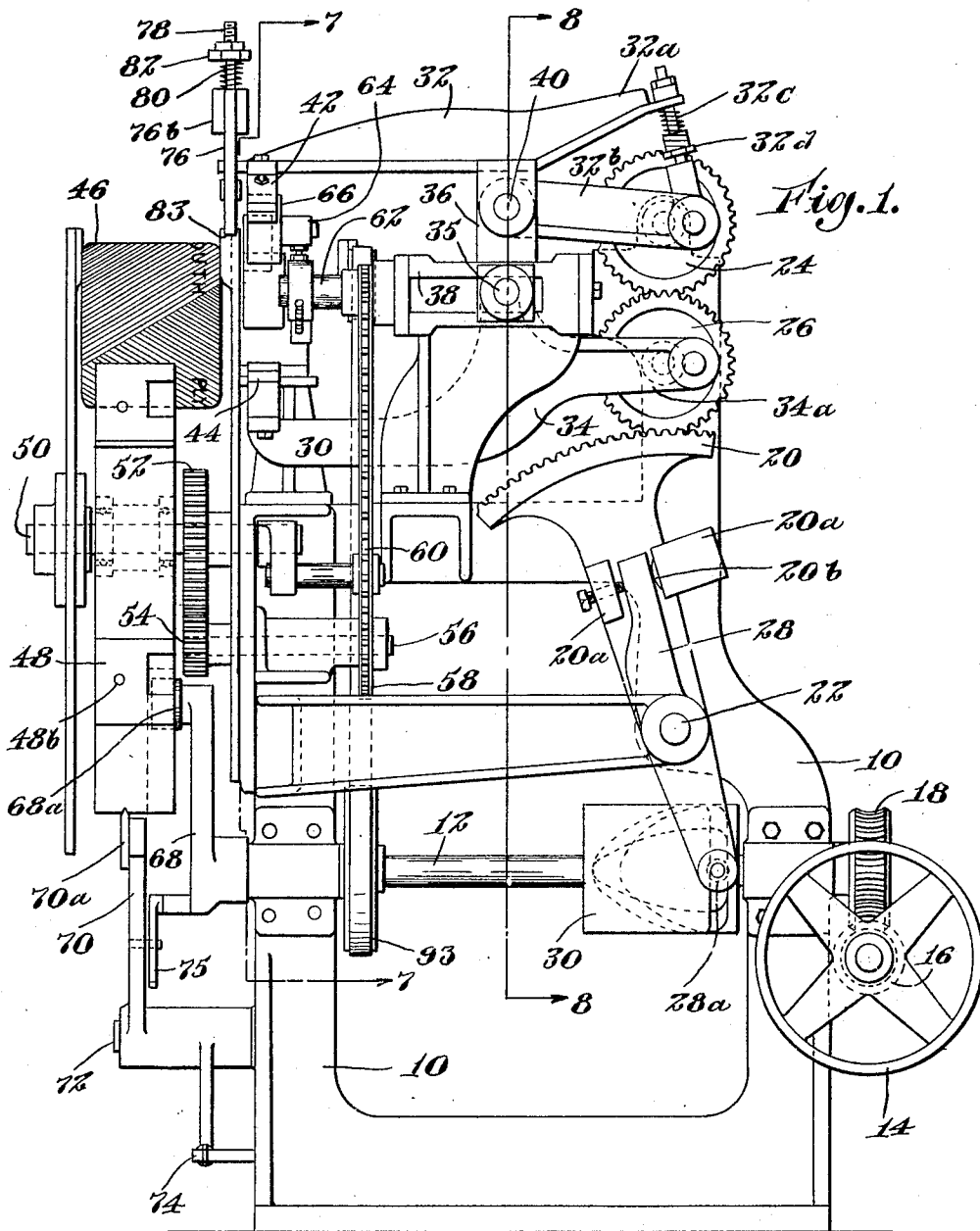
J. H. DAMON

1,728,151

CURVED SURFACE PRINTING MACHINE

Filed Aug. 4, 1926

6 Sheets-Sheet 1



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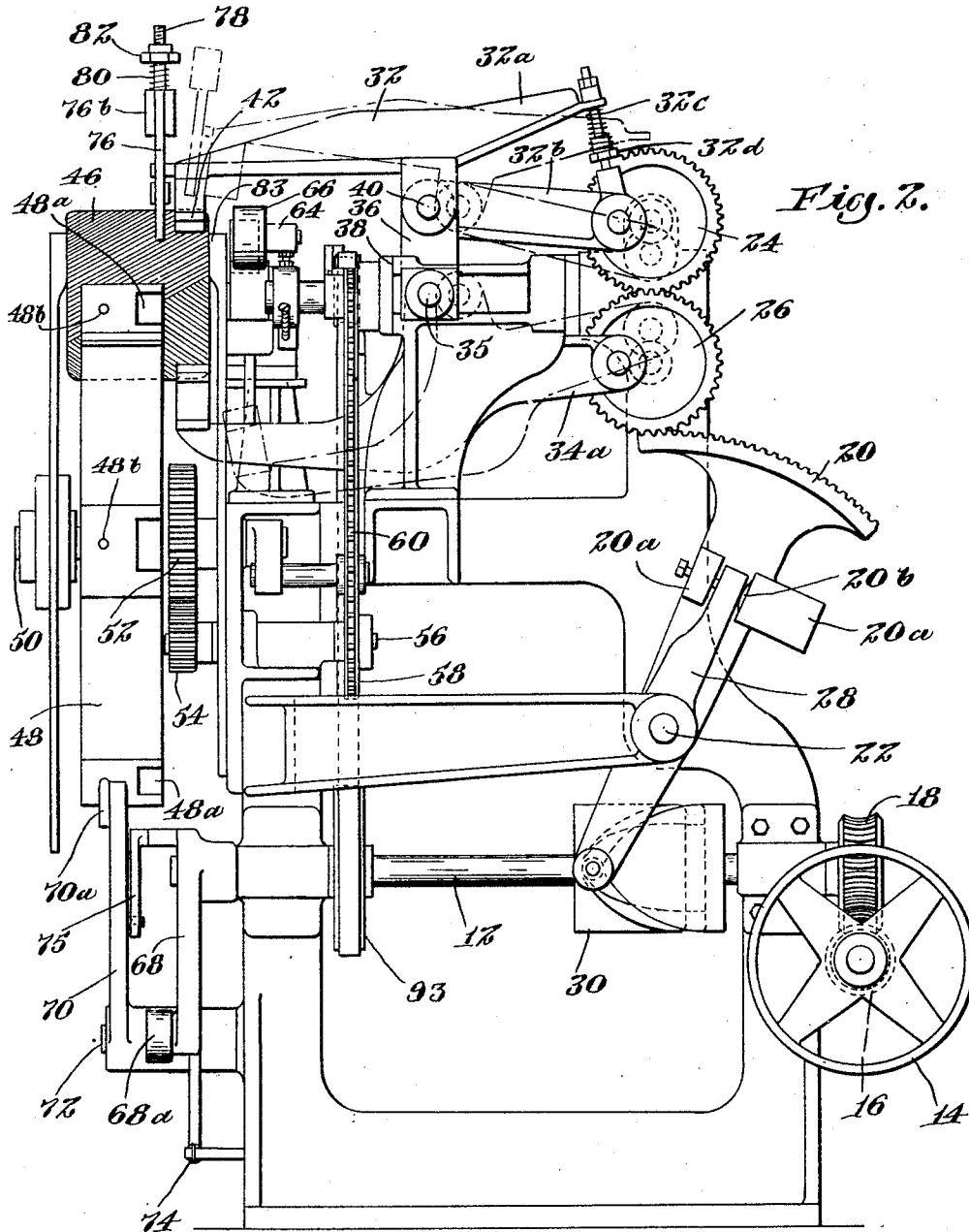
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CURVED SURFACE PRINTING MACHINE

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6 Sheets-Sheet 2



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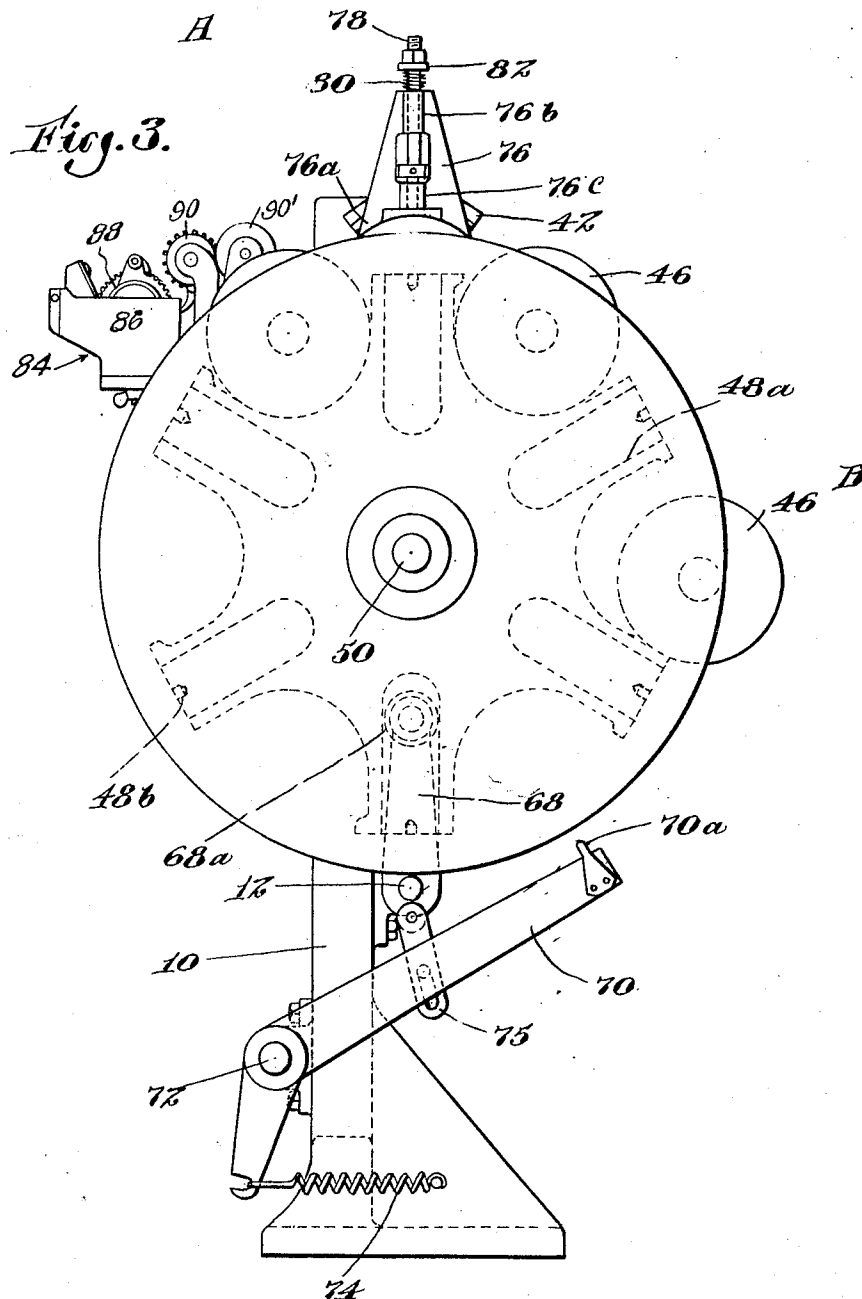
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6 Sheets-Sheet 3



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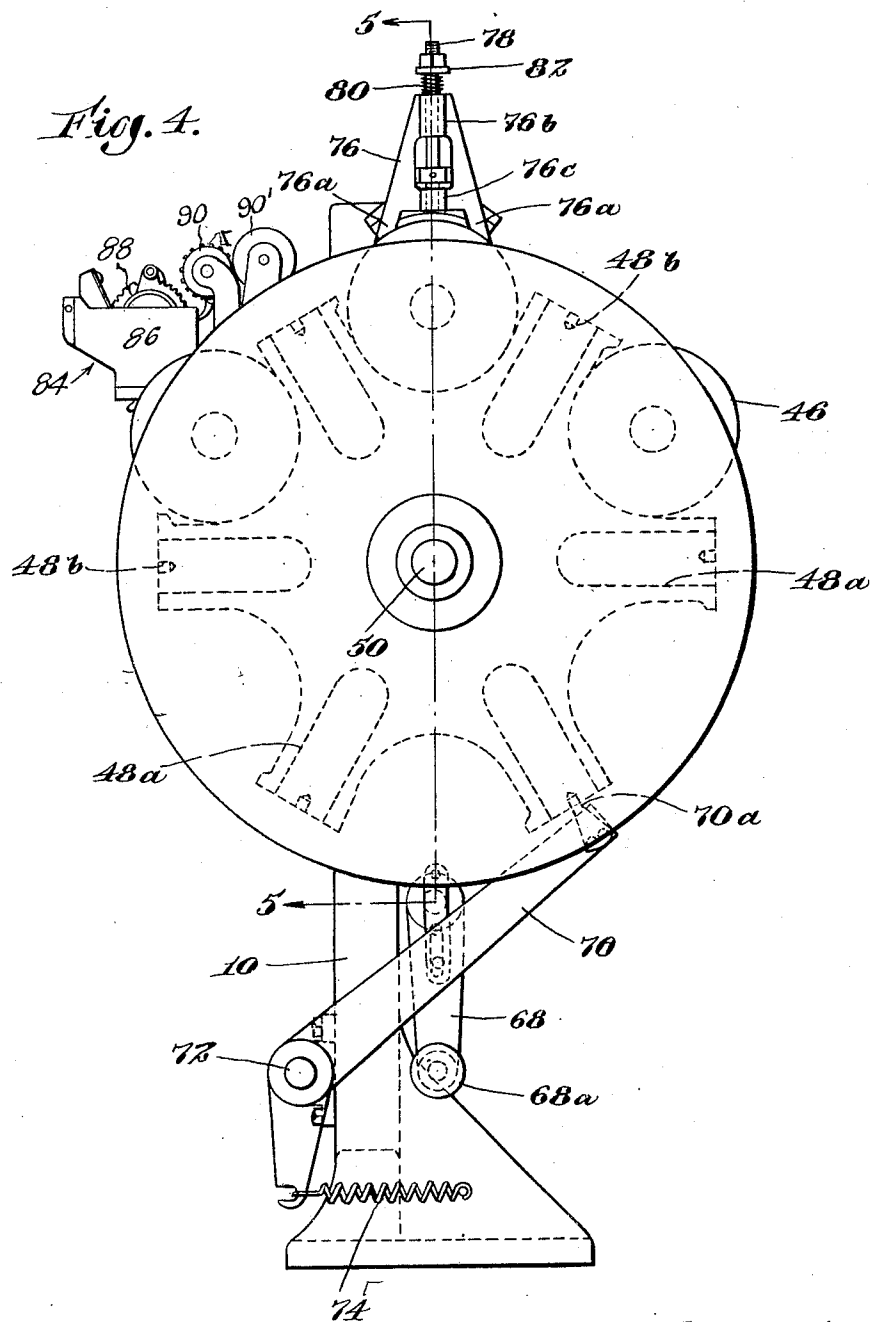
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CURVED SURFACE PRINTING MACHINE

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6 Sheets-Sheet 4



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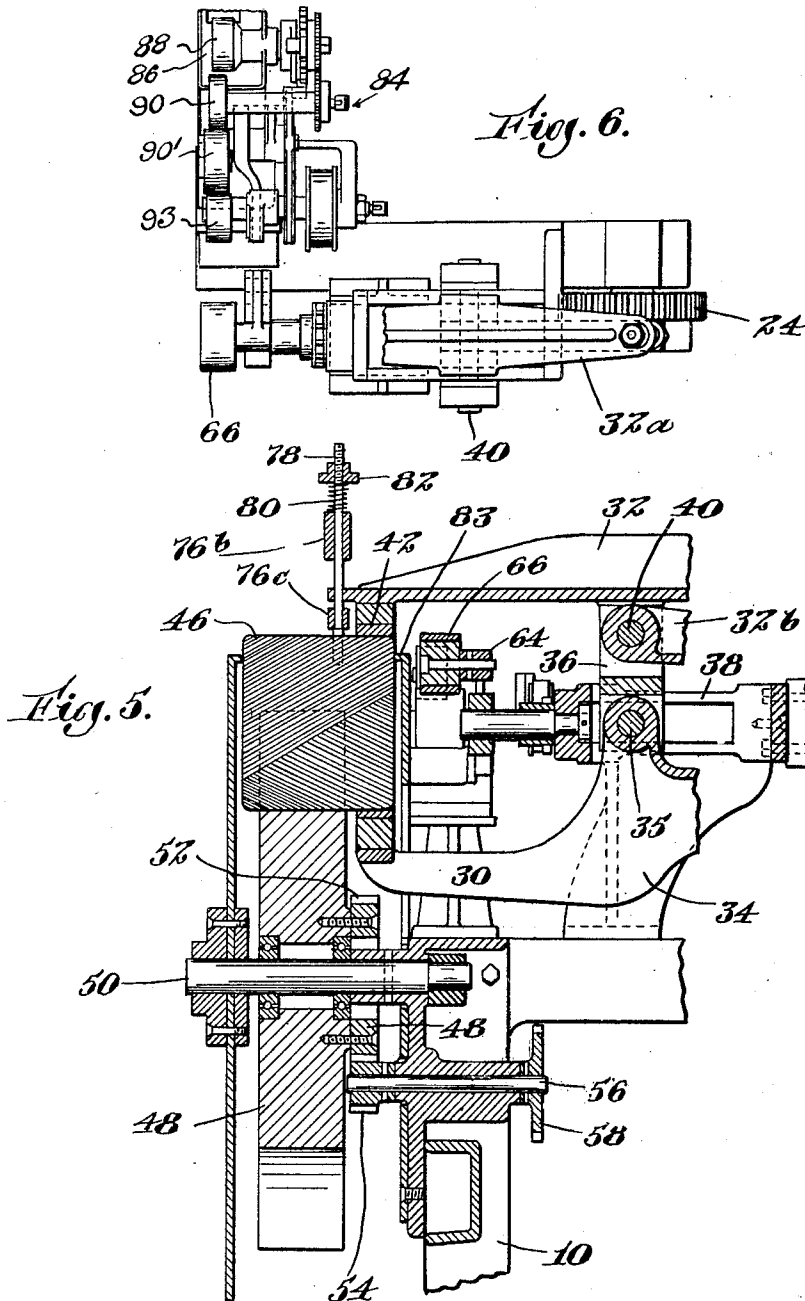
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CURVED SURFACE PRINTING MACHINE

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6 Sheets-Sheet 5



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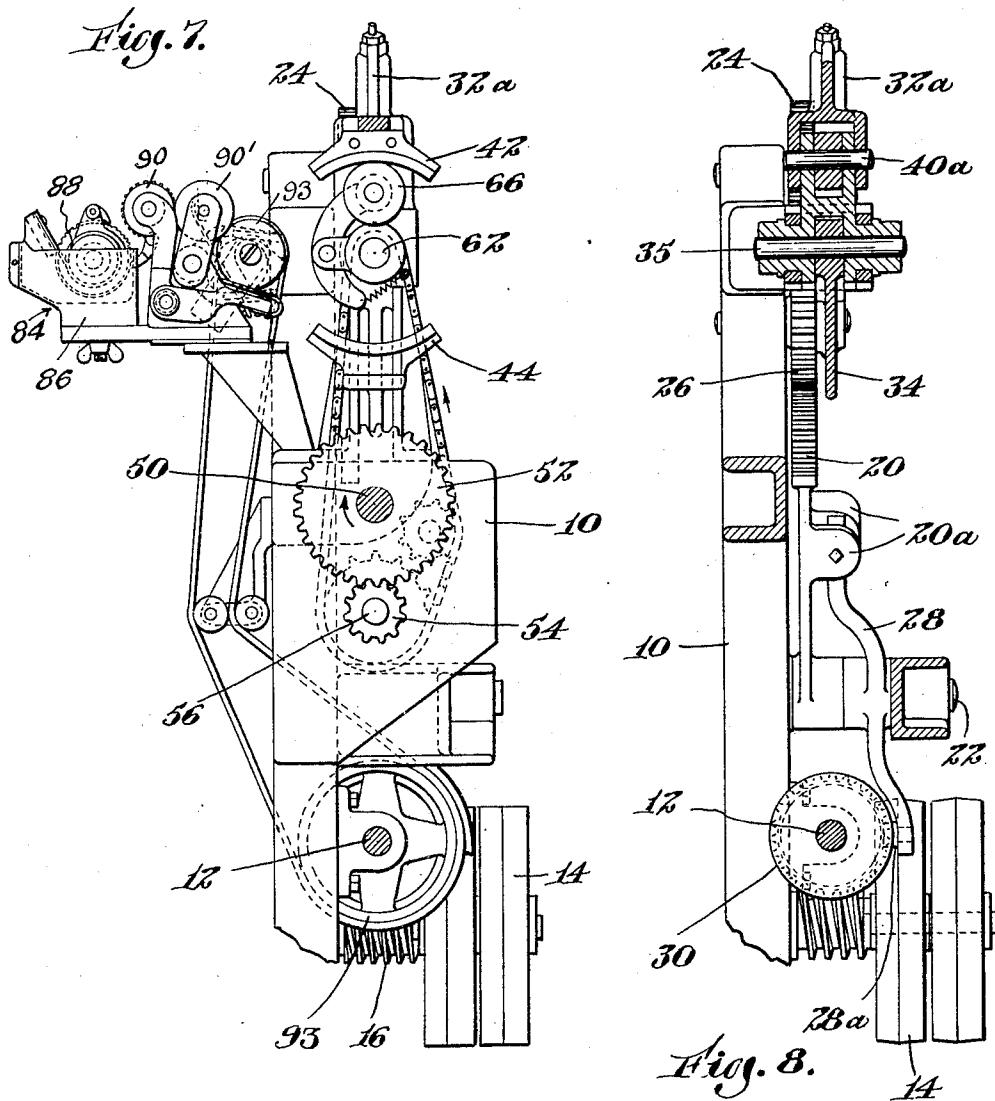
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CURVED SURFACE PRINTING MACHINE

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6 Sheets-Sheet 6



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UNITED STATES PATENT OFFICE.

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CURVED-SURFACE PRINTING MACHINE.

Application filed August 4, 1926. Serial No. 127,003.

This invention relates to improvements in curved surface printing machines. More particularly it is here disclosed as adapted for imprinting a mark or name upon the cylindrical and rough surface of a ball or cop of binder twine or the like.

It has for an object to provide means so that a permanent and unmistakable mark may be printed, on the surface of the twine of the ball. It is a further object to provide an automatic device for accomplishing this result which will be easy to operate and efficient and practical in use. The mark thus printed may be the name or trade mark of the twine manufacturer.

These objects are gained with apparatus embodying a pair of co-operating type-bearing rocker-levers pivoted in a slide. The forward or printing ends of the two rocker-levers carry opposed curved-face jaws having printing surfaces adapted to clamp and to fit the curved surface of a ball of twine and thus to print on its surface. The rear ends of these two levers are connected to crank pins, one pin on each of a pair of gears which intermesh and are simultaneously rotated, first in one direction and then in another, by a segmental rack which is oscillated by a cam on a continuously rotating drive shaft. The oscillating rotation of the intermeshed gears, through approximately quarter circles to each side of the point of tangency of the gears, accompanied by forward sliding movement of the gears and levers as a group, causes opening and closing of the clamping jaws simultaneously with a beginning and ending of a forward movement of the levers, and the like opening and closing movement during the backward travel of the same. The balls of twine, which are to be printed near one end of the cylindrical surface of each ball are supported at the central and other end part of said surface by nestling each in a hollow between two points of a star-wheel holder to which position they singly are fed from one side of the machine; are advanced to printing position by the intermittent turning of the star-wheel; are printed and then further advanced by the movement of the star-wheel, being finally discharged on the

opposite side of the machine. As a ball is advanced by the rotation of the star-wheel, the clamping jaws are for an interval stationary in their rear and most closed position and are there inked by the circular sweep of an inking roller. Then the jaws open, advance to ball clamping position and close upon the ball; the star-wheel holding the ball being locked against turning while the twine is being printed and immediately unlocked as the jaws are opened and retracted, thus leaving the star-wheel free to move at the start of the next cycle.

It is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty exist in the invention disclosed.

In the accompanying drawings:

Figure 1 is an elevation of a machine embodying the invention, illustrating the positions assumed when the printing surfaces of the clamping-jaws are being inked;

Figure 2 is a like view showing, in full lines, the positions assumed when a ball of twine is being printed, and showing, in dot and dash lines, the jaws in open position;

Figure 3 is an elevation at right angles to Figure 1, the jaws being in position to be inked and the star-wheel being in the act of discharging a printed ball and advancing another ball to printing position;

Figure 4 is a view like Figure 3 showing the star-wheel locked and a ball being printed;

Figure 5 is an elevation in section on line 5-5 of Figure 4;

Figure 6 is a plan of a portion of the device showing the position of the rocker-levers and also showing the inking mechanism;

Figure 7 is an elevation in section on line 7-7 of Figure 1; and

Figure 8 is an elevation in section on line 8-8 of Figure 1.

Referring to the drawings, 10 indicates a supporting frame and 12 a drive shaft receiving power in any desired manner, as by pulley 14 acting through worm 16 and worm wheel 18. A segmental gear 20 is loosely mounted on stub-shaft 22 and meshes with the lower one of a pair of vertically enmeshed gears 100

24, 26 arranged thereabove. A lever 28 for oscillating the segment is also loosely mounted on shaft 22, its lower arm carrying a roller 28^a in a grooved cam 30 on the drive shaft, which rocks the lever. The upper arm of the lever lies between two projections 20^a on the segment 20, one or both of which projections may house a spring pressed pin 20^b against which lever 28 engages resiliently to urge the segment in the direction of travel of the lever. Gears 24, 26, being in mesh, are rotated in opposite directions by the segment 20 as the latter moves; and their direction of rotation is reversed whenever the direction of travel of the segment is reversed.

Two oppositely disposed rocker-levers are indicated at 32, 34, respectively, both pivoted in a single block 36 which is slidable in the guide 38 horizontally toward and from the ball 46 which is to be printed. The upper rocker-lever 32, pivoted as at 40 on the slide block 36, has its rearward arm 32^a resiliently spaced from the crank pin of gear 24 which rocks it by spring 32^c. This arm is integral with the forward projecting portion of rocker-lever 32, and transmits the power for the printing impression. A connecting rod or arm 32^b extends from the same crank-pin of gear 24 forward to the slide block 36 on which the lever 32 is pivoted at 40. Through this arrangement, when rod 32^b and block 36 are moved horizontally by a half-rotation of gear 24 the rocker-lever 32 as a whole will be resiliently rocked, with its forward printing end being moved vertically up and then down, the spring 32^c being sufficiently strong to communicate this motion, and preferably being adjustable in stiffness by the nut 32^d, thereby to adjust the printing pressure for balls of a given size. The lower rocker-lever 34 may be formed in one piece pivoted at 35 on the slide block 36 and having its rearward extending arm 34^a with direct connection to the crank gear 26. The forward projecting portion of each rocker-lever carries a clamping jaw at its end. The upper jaw is indicated at 42 and the lower at 44, both being of like construction. The inner surfaces of the jaws are covered with a resilient material, such as rubber, suitably engraved, cut or shaped to make the desired imprint on the twine mass, and by which any variations in curvature, due to different size of balls in compensated for.

The balls of twine 46 are supported and fed to printing position in a star-wheel 48 mounted to rotate on shaft 50. A gear 52 on the star-wheel meshes with pinion 54 on counter shaft 56, on which is a sprocket-wheel 58 whose chain 60 turns a stub-shaft 62 located between the rocker-levers 32, 34, and carrying the arm 64 with inking roller 66 whose orbit about the stub-shaft sweeps the roller over the printing faces of the jaws 42, 44, when the stub-shaft is rotated. Such rota-

tion occurs only when the star-wheel 48 is rotated a step to advance a ball to printing position, at which time the jaws are in their rearmost and closed position, there being then an interval of time, provided by the cam 30, when the jaws remain stationary. The star-wheel 48 is intermittently rotated a step by an arm 68 carried on the end of the drive shaft 12. A roller 68^a on the end of this arm engages in one of a series of slots 48^a in the star-wheel upon each revolution of the drive shaft. The sweep of arm 68 rotates the star-wheel one sixth of a revolution, thus advancing a ball to printing position and letting a printed ball fall out to be discharged from the wheel.

Accidental movement of the star-wheel after each positive advancement is prevented by locking the wheel during the printing of a ball. For this purpose a lever 70 is pivoted as at 72 at the base of the machine and carries on its free end a pin 70^a adapted to engage in one of a series of holes 48^b in the star-wheel. The pin is continually urged toward the star-wheel by a spring 74 but, through a crank with slotted link connection 75 between the lever 70 and the shaft 12 is permitted to engage and lock the wheel only at certain periods, which occur after the arm 68 on that shaft has positively moved the wheel to advance the balls.

The ball to be printed is centered and securely held in position for its printing by a device carried on the end of the upper jaw 42. This consists of an A shaped member 76, (Fig. 4) the legs 76^a of which first engage the ball. To the jaw 42 is secured an upstanding pin 78 which passes through portions 76^b, 76^c of member 76, the jaw extending between the two said portions. A spring 80, arranged between the top portion 76^b of the member 76 and a washer 82 on the top of the pin 78, normally holds the member 76 projected downward from the jaw; but as the jaws move to printing position the legs 76^a engage the ball to center it and to hold it firmly and then the spring 80 yields as the jaw 42 descends and prints the surface of the ball. With such a construction a variation in size of balls is provided for, and damage to the machine which might otherwise result from over-sized balls is prevented. Such a contingency is further provided against by the construction of the upper rocker-lever 32 which, as before described, is resiliently moved to operative positions. The lower rocker-lever and its clamping jaw require no such resiliency, as the lower surfaces of the balls always occupy the same position with sufficient precision, regardless of the size of the ball. The centering device 76 is prevented from interfering with the inking of the jaw 42 by being held out of the way by engagement against a fixed plate 83 when re-

tracted, while the jaw 42 descends to inking position.

Apparatus for continually supplying ink to the inking roller 66 is indicated generally at 84. A reservoir 86 has a roller pad 88 intermittently rotated therein and ink is transferred from this pad 88, by roller pads 90, 90', to the delivery roller 93 with which the revolving ink roller 66 engages. The series of inking rollers are driven through a belt connection with pulley 93 on the drive shaft 12.

In operation the twine balls 46 are fed into the star-wheel 48 on the side indicated at A and are discharged at B. The cam 30 on drive-shaft 12 will cause reciprocating rotation of the gears 24, 26 through the medium of segment 20. This rotation results in the opening and closing of jaws 42, 44 simultaneously with the forward movement of the rocker-levers 32, 34 as a group; and then their opening and closing on backward movement. When the star-wheel is being rotated by arm 68 to advance the balls, the jaws are in their rearmost and closed position and are there being inked by the sweeping motion of the inking roller 66, while they are stationary due to the cam 30. The jaws having been inked and the star-wheel rotated a step the jaws proceed to open and to advance toward printing position. While the jaws are thus moving forward the crank controlling the link 75 lets lever 70 move its pin 70^a into engagement with a hole 48^b in the star-wheel to lock the latter against movement, where it stays till the said crank gets around to push it out. Meanwhile, as the jaws close on the ball, the centering device 76 first engages the ball and holds it securely; the jaw 42 moves down against the pressure of spring 80; and the two jaws embrace the ball and thus print upon its surface. Then the jaws open and travel rearward, the wheel being at the same time unlocked and thus made ready to be turned upon the commencement of the next cycle.

The invention thus provides practical and efficient means for printing upon the rough surface of a twine ball or cylinder for any purpose, as for example thereby to indicate the right end-up position for the balls, or to apply on the balls the name or trade mark of the manufacturer. While the disclosure herein contained has been confined to the use of the invention in connection with marking the surfaces of balls of binder twine, it should be understood that the invention is not limited to such a restricted use.

I claim as my invention:

1. Printing apparatus comprising a support for a round body to be printed combined with a rocker-lever having a curved printing jaw and means for guiding said lever with combined translation and rocking motion alternately into and out of printing engagement

with the curved surface of a body on said support.

2. Printing apparatus comprising a support for a round body to be printed combined with a slidably mounted rocker-lever having a printing jaw at one end, a gear with crank connection to the other end, said lever adapted for sliding said lever and simultaneously rocking it yieldingly and means for rotating said gear to and fro thereby to move the said jaw alternately into and out of printing engagement with the curved surface of a body on said support.

3. Printing apparatus comprising a support for a round body to be printed combined with a slidably mounted rocker-lever having a printing jaw, a gear with crank connection to said lever, a driving segment and driving connections yieldingly to actuate said segment, thereby to rotate said gear first in one direction and then in another, all of said connections being arranged to rock and to slide said lever simultaneously, and thereby to move the said jaw alternately into and out of printing engagement with the curved surface of a body on said support.

4. Printing apparatus comprising a support for a round body to be printed combined with a pair of slidably mounted rocker-levers having opposed printing jaws, two meshing gears each with crank connection to its respective one of said levers, and a reciprocating segment meshing with one of said gears, the whole being organized to rock and to slide to and fro said levers simultaneously, thereby to move the said jaws alternately into and out of printing engagement with the curved surface of a body on said support.

5. Printing apparatus comprising a rotatable support for advancing round bodies to be printed and means for holding it intermittently, combined with a pair of slidably mounted rocker-levers having opposed printing jaws, two meshing gears each with crank connection to its respective one of said levers, and a segment adapted to be yieldingly actuated to rotate said gears first in one direction and then in another, the whole being organized for this rotation to rock and to reciprocate said levers simultaneously, and the said jaws being set to move thus alternately into and out of printing engagement with the curved surfaces of bodies on said support.

6. Printing apparatus comprising a movable support for bodies to be printed, adapted to be moved intermittently to advance said bodies successively to printing position, combined with a slidably mounted rocker-lever having a printing jaw which is adapted to be moved alternately into and out of printing engagement with the curved surface of a body on said support, means so to move the jaw, and means carried by said jaw for centering a body while it is being so printed.

7. In twine ball printing apparatus, a sup-

port for a ball combined with a rocker-lever having a printing jaw which lever is mounted to be rocked and simultaneously to be reciprocated toward and from the round surface of said ball.

8. In twine ball printing apparatus, a rotatable support for balls, means for turning said support intermittently to advance the said balls to printing position, and means for locking said support after each said turning, combined with a rocker-lever having a printing jaw set in position for printing engagement with the surfaces of said balls when the support is locked in position, and means for rocking said lever yieldingly and for transmitting reciprocating motion thereto, thereby to move the said jaw alternately into and out of said engagement.

9. In twine ball printing apparatus having a support for a succession of balls, and printing jaws for a ball in one position thereon, the combination, with the jaws, of a pair of rocker-levers having opposed printing jaws mounted to be rocked and simultaneously to be reciprocated toward and from the surface of a ball, two meshing gears each with crank connection to one of said levers, a segment adapted to rotate said gears first in one direction and then in another to rock and to reciprocate said levers simultaneously, a cam for actuating said segment yieldingly to move the said jaws alternately into and out of printing engagement with the surfaces of balls, means for inking the printing surfaces of said jaws, and means carried by one of the jaws for centering and holding a ball while it is being printed.

10. Printing apparatus comprising the combination of a rotary holder for a plurality of articles, adapted to hold each article with the portion thereof which is to be printed projecting from the holder in the direction of the axis of the holder; with a pair of clamping printing jaws, adapted to embrace the projecting part of the article; and means to reciprocate the pair between positions, one of which is said embracing position, for clamping and printing the article, and the other of which is outside of the path of rotation of said holder and the articles in it.

11. Printing apparatus comprising the combination of a rotary holder for a plurality of articles, adapted to hold each article with the portion thereof which is to be printed projecting from the holder in the direction of the axis of the holder; cooperating rocker levers, one of which is a printing jaw; a bearing element, on which both levers are pivoted; and means for moving said element to and from the article position and for simultaneously rocking said levers on their said moving bearing.

12. Apparatus for printing in a plurality of locations around a round body, comprising, in combination, a support for holding in

succession round bodies which are to be printed; an adjacent inking roll; a pair of rocker-levers having opposed printing jaws, said levers being mounted on reciprocating pivots; means to rock said levers and to reciprocate the said pivots simultaneously, the reciprocating of the pivot-mount carrying the jaws alternately to the round body and to the inking roll; and the rocking of the levers being an opening and closing of the jaws on each one-way movement of the mount, whereby they close, alternately, in printing engagement with the body on said support, and for inking engagement with said roll.

13. Apparatus for printing in a plurality of locations around a round body, comprising, in combination, a support for holding in succession round bodies which are to be printed; a plurality of printing jaws, each adapted in form and position to fit different parts of the surface of a body which is being printed; and mounting means, whereon the jaws are movable simultaneously, to respective printing locations on opposite sides of the body held in said support; whereby by simultaneity of impression each jaw constitutes a platen for the other, and their impressions are spaced apart on the body.

14. Printing apparatus comprising, in combination, a rotary holder for a plurality of round articles, adapted to hold each article with the portion thereof which is to be printed projecting from the holder in the direction of the axis of the holder, a pair of arcuate clamping printing jaws adapted to reciprocate between a closed printing position where said jaws have their printing faces approximately in a circle embracing the said projecting portion of the article, and an inking position outside the path of rotation of said holder and articles held by it, wherein said jaws are closed with their arcs approximately in a circle; and an arm rotatable about the axis of said arcs when they are in inking position, carrying an inking roll whose orbit includes said arcuate printing surfaces in their said outside position.

15. Printing apparatus comprising a support for a round body to be printed combined with a rocker-lever having a curved printing jaw, a slidably mounted pivot for the rocker-lever, a fixed track for guiding the pivot, and means for rocking the said lever and for sliding its said pivot to and fro, thereby to move the said jaw alternately into and out of printing engagement with the curved surface of a body on said support.

16. Printing apparatus comprising a support for bodies to be printed, adapted to be moved intermittently to advance said bodies to printing position, combined with a printing jaw, a rocker lever carrying it, and a slidable pivot on which the rocker-lever is mounted to have motion of translation with the said pivot, and rotary motion around said

pivot, whereby said jaw is adapted to be moved alternately into and out of printing engagement with the curved surface of bodies on said support, a fixed track guiding and
5 steadying said pivot in its sliding, means for inking the printing surface of said jaw when out of said printing engagement and means for moving the jaw into and out of the said engagement.

10 Signed at Plymouth, Massachusetts, this 30th day of July, 1926.

JOHN H. DAMON.

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