

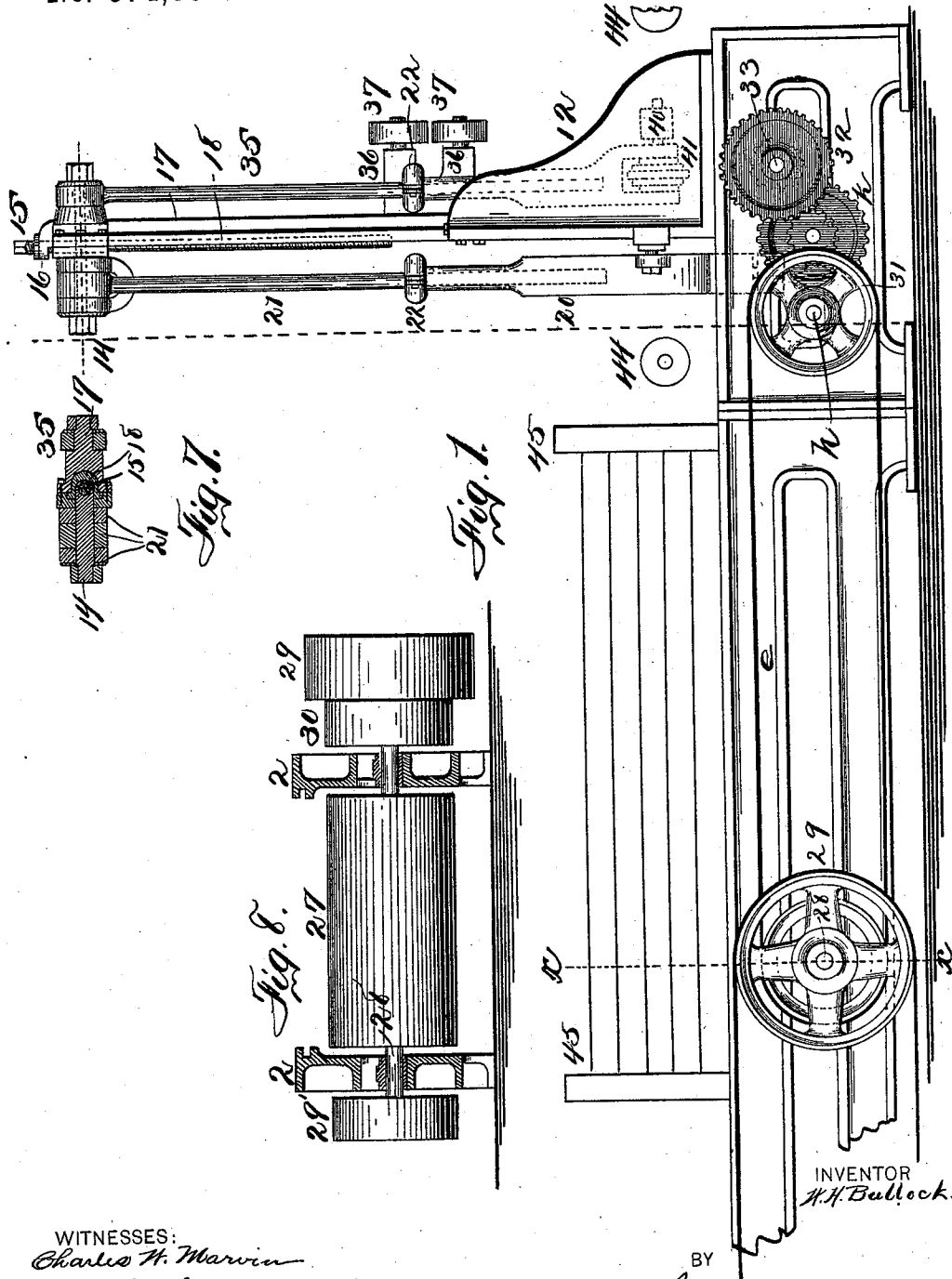
(No Model.)

3 Sheets—Sheet 1.

W. H. BULLOCK.  
MACHINE FOR MANUFACTURING TANKS.

No. 574,598.

Patented Jan. 5, 1897.



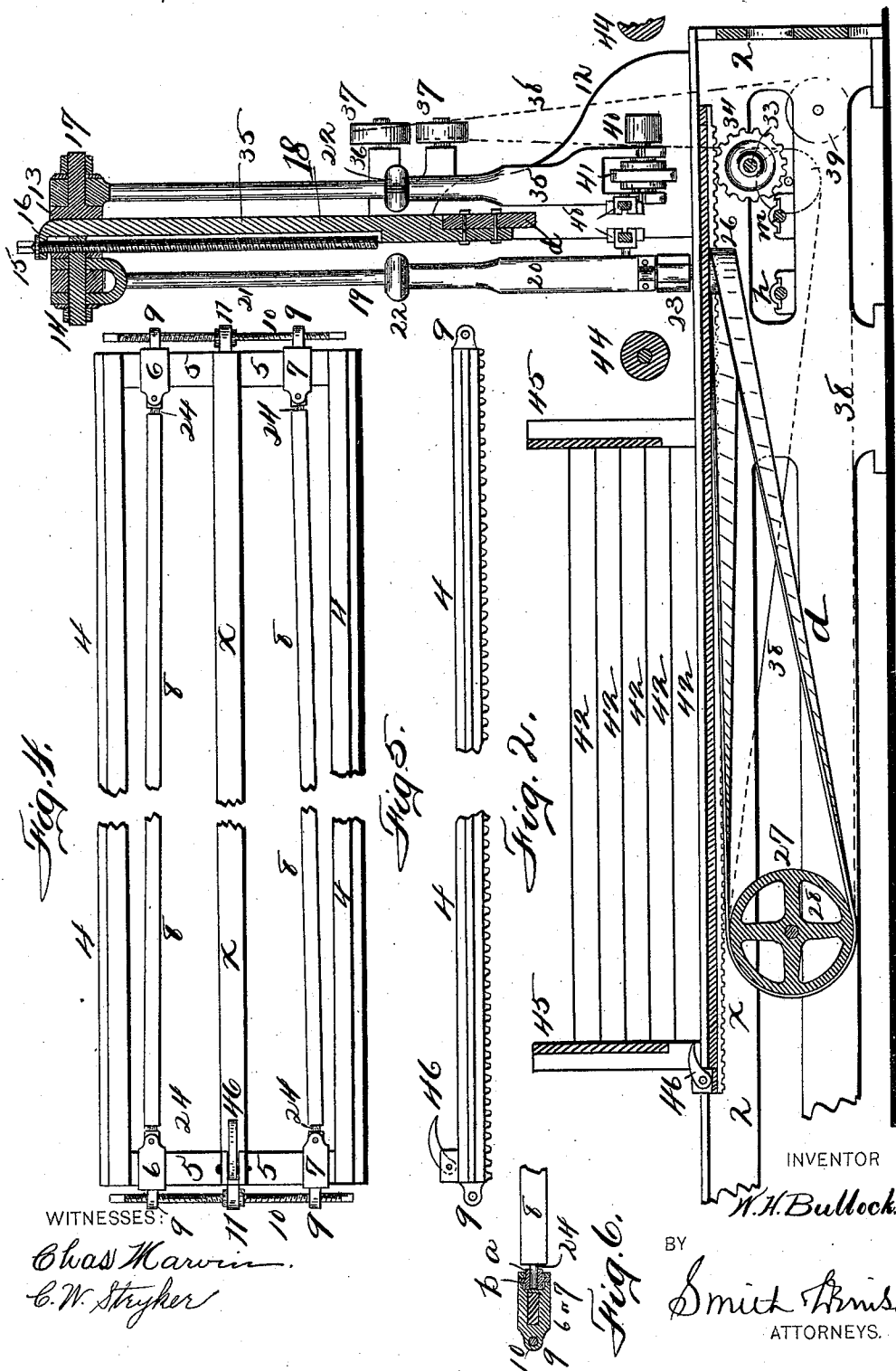
WITNESSES:  
Charles H. Marvin  
C. W. Stryker

INVENTOR  
W. H. Bullock.  
BY  
Smith & Arnison  
ATTORNEYS.

3 Sheets—Sheet 2.

No. 574,598.

Patented Jan. 5, 1897.



(No Model.)

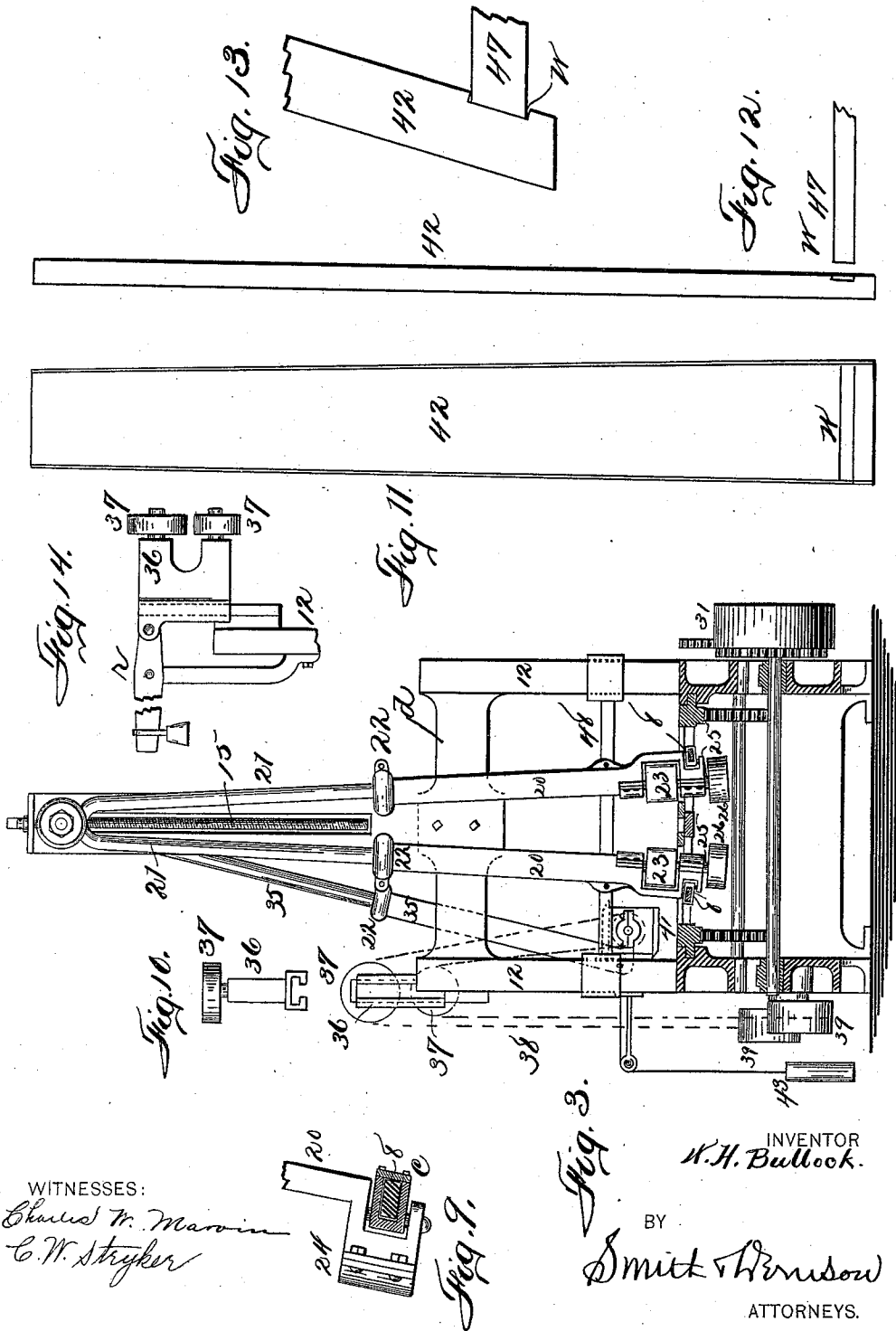
3 Sheets—Sheet 3.

W. H. BULLOCK.

MACHINE FOR MANUFACTURING TANKS.

No. 574,598.

Patented Jan. 5, 1897.



# UNITED STATES PATENT OFFICE.

WILLIAM H. BULLOCK, OF OSWEGO, NEW YORK, ASSIGNOR TO THOMSON  
KINGSFORD, OF SAME PLACE.

## MACHINE FOR MANUFACTURING TANKS.

SPECIFICATION forming part of Letters Patent No. 574,598, dated January 5, 1897.

Application filed March 23, 1896. Serial No. 584,392. (No model.)

*To all whom it may concern:*

Be it known that I, WILLIAM H. BULLOCK, of Oswego, in the county of Oswego, in the State of New York, have invented new and useful Improvements in Machines for Manufacturing Tanks, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to machines for tapering, beveling, and crozing staves, especially for tanks or cisterns, which are usually frusto-conical in form, the top and bottom being of unequal radii.

My object is to produce an improved machine for longitudinally tapering staves and beveling their edges, either simultaneously or separately, the beveling being upon a constant radius, that of one of the heads of the tank, for crozing each stave upon the radius of the circle of the plane of the head to be inserted into the crozes, all of such tapering, beveling, and crozing mechanism being so mounted as to be adjustable to the radius of a head of almost any diameter.

In this machine one pair of cutters does the work of beveling and tapering, being mounted upon swinging arms of equal and variable length, both of which are hung upon a single arbor, like unto the legs of a compass, suitable means being provided to simultaneously vary their length to vary the distance of the cutters from said pivotal arbor, so as to adjust their length to be the same as the radius of one of the heads of the tank, in order to start the bevel upon that radius.

A crozing-cutter is suspended from an arbor in alinement with said pivot-arbor, and is simultaneously adjusted with the cutters by raising or lowering said arbor, so that when this cutter is swung across a stave a croze is cut therein upon the arc of the circle of which said croze-arm is the radius.

A bed 2 is suitably mounted, and upon this is mounted a frame provided with bars adapted to rock in end bearings, said bearings being adjustable to set said bars according to the radius of one of the heads of the tank, and these bars guide the cutters to both taper and bevel both edges of the stave which is carried upon said frame through between them.

It is constructed as follows, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation of the machine. Fig. 2 is a vertical longitudinal section thereof. Fig. 3 is a vertical cross-section thereof. Fig. 4 is a top plan of the frame in which the taper-regulating bars are mounted. Fig. 5 is a side elevation of said frame. Fig. 6 is a sectional detail of an end bearing for said bars. Fig. 7 is a section of the pivotal mounting of said cutter and crozing legs. Fig. 8 is a sectional detail on line *x*, Fig. 1, of the drum, its mounting, and pulleys upon its driving-shaft. Fig. 9 is an enlarged sectional detail of the connection of a cutter-leg to a taper-regulating bar. Fig. 10 is a top plan of one of the crozer-driving pulleys and its support upon the main frame of the machine. Fig. 11 is a top plan of a finished stave. Fig. 12 is an edge view thereof and of part of a head-strip in position to enter the croze. Fig. 13 is an enlarged detail of the joint between a stave and a head-strip. Fig. 14 is an enlarged detail in elevation of the belt-tightener for the crozing-cutter belt.

Upon a suitable support a bed 2 is mounted and in suitable ways thereon a frame is mounted and adapted to be traversed, consisting of side rails 4, fitting said ways, end rails 5, upon which the slides 6 7 are mounted, and to which slides the taper-regulating bars 8 are connected by means of end trunnions 24, loose in the block *a*, which is pivoted upon a pin *b*, as shown in Fig. 6. A central rail *x* is secured to said ends and provided with a rack. (Shown in Fig. 2.) These slides are provided with ears 9, receiving the right and left hand screws 10, which are journaled in lugs 11 upon said end rails, so that by turning said screws the ends of said bars are adjusted so as to regulate the taper of the sides of a stave according to the radii of the respective heads or ends of the tank.

Standards 12 are erected upon the frame 2 and connected by a cross-bar *d*, upon which a post 18 is erected, having an overhanging flange 16, receiving a screw 15, which also has a threaded bearing in a carrier block or frame 13, which is provided with lateral arbors 14 17 in the same horizontal plane. Upon one

of these arbors the cutter-legs 19 are suitably pivoted, each leg consisting of a shank 21 and a tubular body 20, receiving said shank, a clamp 22 securing them together whenever the legs are adjusted to the length desired. These bodies are each provided with a recess in which a slide *c* is mounted, through which a guide-bar 8 passes, and 23 is a suitable beveling and tapering cutter secured upon a shaft 25, journaled in a bearing 24 in said leg and driven by a belt *d* from the drum 27 on the shaft 28 to the pulley 26 on the cutter-shaft.

The shaft 28 is journaled in the main frame and provided with a drive-pulley 29, suitably connected to any source of power. A pulley 30 on the shaft 28 and belt *e* drives the pulley 31 on the shaft *h*, and by means of a pinion thereon (not shown) and the gear and the pinion *k* on the shaft *m* drives the gear 32, its shaft 33, and the pinion 34 thereon, which engages with the rack on the bar *x* to traverse the traversing and stave-carrying frame.

Upon the arbor 17 (or an extension of arbor 14) a sectional crozing-leg 35 is journaled to swing freely, such sections being locked together by a clamp the same as those of the legs 19. By loosening all of these clamps of these several legs and operating the screw 15 to raise or lower said carrier, which is suitably guided, the projection of their upper sections above the lower ones is varied simultaneously and equally, and thus the length of all of said legs is varied, and thus they are all adjusted to the radius desired, which is usually that of the lower head of the tank. Upon a suitable way upon a standard 12 a slide 36 is mounted, provided with suitable lateral arbors for the idlers 37, around which the belt 38 from the pulley 29' on the shaft 28 passes, guided by the idlers 39, to drive the pulley 40 upon a shaft journaled in said leg 35, and upon which a suitable crozing-cutter 41 is mounted. By means of weight and lever *r*, connected to said slide, the swinging forward of the crozing-leg will draw said slide down, and when it swings back said slide will be raised, acting at all times as a belt-tightener. When said crozing-leg is swung forward, the stave 42 will be crozed transversely upon the arc of the circle of the head of which said leg is the radius, and then the cord and weight will swing it back to its normal position and hold it there.

Suitable rollers 44 hold the stave down onto the frame.

A suitable holder 45 is erected upon the bed to hold a number of staves, and 46 is a dog upon said traversing frame adapted to engage with the end of a stave, force it out of this holder, and through between the tapering and beveling cutters to the position for crozing.

The croze *W* is cut at a right angle to the inner face of a stave, and the head-strips 47 enter it at an angle to said face, which causes or creates a binding action or grip upon said head-strips, substantially as shown in Fig. 13.

It will be seen that all of the cutter-legs are set at the length of the radius of the circle of

a head; that the tapering and beveling cutters are guided and regulated by the adjustment of the regulating-bars in the stave-carrying frame and caused to follow the direction of said bars and swing upon their pivot accordingly, said frame-bars being mounted to rock, as shown, in order to accommodate themselves to the swing of said cutter-legs, and that by such swing the edges of the stave are beveled and said bevel is cut upon a line always radial to the circle of said tank at either the top or bottom, as predetermined, the bevel not remaining constant to said radius.

Each of the beveling cutter-legs is suitably connected to a cross-bar 48 between the up-rights 12 and held from swinging laterally.

It will be further seen that the bars 8 constitute the templet or pattern for tapering the staves; that these bars traverse the slides *c*; that these slides swing laterally and coincidentally with the cutter-legs, and that as the legs and slides swing together while said bars are traversing the slides said bars are thereby rocked in their end bearings because the slides are secured to said legs, and said bars cause the legs to swing to follow their respective alinement whereby the cutters cut the taper of the stave. Said bars rock as the cutter-legs swing away from their constant radius and according to the degree of such departure, so that the cutters cut the bevels accordingly.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination with a traversing frame provided with laterally-adjustable rectangular bars adapted to rock in the bearings on said frame, of swinging legs carrying cutters upon their free ends and slides upon said legs engaging with said bars to follow their alinement as said frame is reciprocated.

2. The combination with a traversing frame, provided with rectangular guide-bars mounted to rock thereon and adjustable to vary their alinement, of cutters mounted upon diverging swinging legs pivoted upon the same center, adjustable to vary their length, and slides upon said legs through which said guide-bars pass and whereby said cutters are swung laterally as said frame is reciprocated.

3. The combination with a table, a traversing frame thereon, slides upon the end rails thereof, rectangular rocking bars connected to said slides and means to adjust them by traversing said slides, of swinging legs and slides thereon traversing said bars to vary the degree of the divergence of said legs as the frame traverses, and cutters upon said legs.

4. The combination with a table, a traversing frame thereon, slides upon the end rails thereof, bars connected to said slides and adapted to rock in the bearings thereon, and means to adjust said bars laterally and in equal degree by traversing said slides, of laterally swinging and diverging legs mounted upon a common center and engaging with said bars to vary the degree of their diver-

gence as the frame traverses, cutters upon said legs, and means to simultaneously adjust the length of said legs to the radius of the circle of the head of the tank.

- 5 5. In a stave-machine, a frame mounted and adapted to traverse upon a suitable support and consisting of side and end rails, slides upon said end rails, longitudinal rectangular bars journaled to rock in said slides  
10 and screws for shifting said slides to vary the spaces between the ends of said bars, in combination with cutters mounted upon swinging legs actuated laterally by the traverse of said frame, and slides upon said legs through  
15 which said bars reciprocate and whereby the staves are tapered and beveled.

6. In a stave-machine, a table, a standard

erected thereon, a slide upon said standard, beveling and tapering and crozing legs suspended therefrom and means to vary their  
20 length simultaneously and equally by shifting said slide, in combination with a traversing frame upon said table engaging with said cutter-legs to guide and swing them, and cutters upon each of said legs whereby a stave  
25 upon said frame is tapered and beveled by the traverse of said frame, and crozed when the crozing-cutter is swung across it.

In witness whereof I have hereunto set my hand this 19th day of March, 1896.

WILLIAM H. BULLOCK.

In presence of—

WM. V. BURR,

H. L. HOWE.