L. C. Camp,

Spinning Brass Kettles.

No. 12,227. Patented Jan. 9, 1855.

Fig. 1.

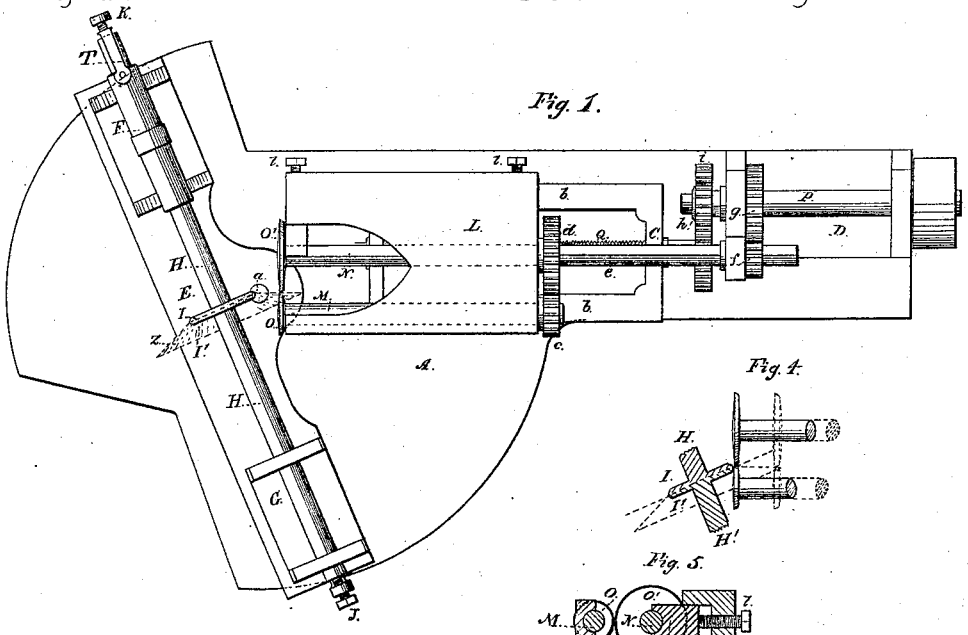


Fig. 4.

Fig. 5.

Fig. 2.

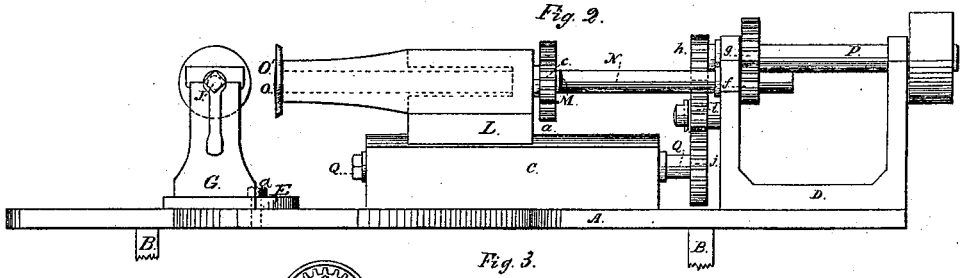
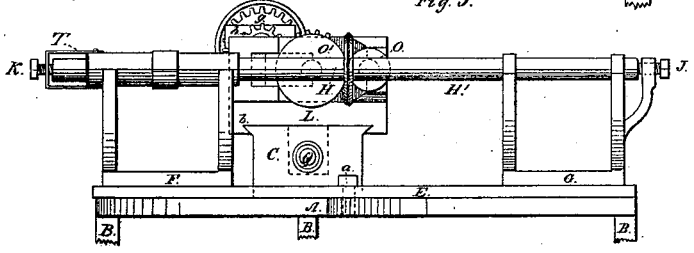


Fig. 3.



UNITED STATES PATENT OFFICE.

LYMAN C. CAMP, OF BERLIN, CONNECTICUT, ASSIGNOR TO PHELPS, DODGE & CO., OF NEW YORK, N. Y.

IMPROVEMENT IN MACHINES FOR FORMING KETTLES FROM METAL DISKS.

Specification forming part of Letters Patent No. 12,227, dated January 9, 1855.

To all whom it may concern:

Be it known that I, LYMAN C. CAMP, of Berlin, in the county of Hartford and State of Connecticut, have invented a new and Improved Machine for Forming Kettles or Similar Vessels from Flat Disks of Brass or other Metal; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a plan of the machine. Fig. 2 is a side view, and Fig. 3 a front view, of the same. Fig. 4 is a top view, partly sectional, of the clamps which hold the disk and the rollers by which it is wrought into the desired form of the vessel. Fig. 5 is a back view of the rollers.

Similar letters of reference indicate corresponding parts in the several figures.

In this machine the disk of brass or other metal is brought to the desired form of the vessel by a process widely different to any heretofore employed for effecting a similar result. The most common, if not the only, processes heretofore employed have been stamping, hammering, and spinning, which last process is performed by machinery, forming the subject of Letters Patent granted to H. W. Hayden, December 16, 1851. By all of the above processes the shape of the vessel is produced either in dies or on a form, and several dies or forms have to be employed in making one vessel. The process as performed by my machine differs from the above, inasmuch as it requires neither die nor form to produce the sides of the vessel, and the formation of the sides of the vessel from the disk is effected from beginning to end without changing any part of the machine, a simple adjustment at certain stages of the process being all that is in any case necessary.

My invention consists in the combination of a pair of rollers of a similar general character to those commonly employed for rolling metal, and a pair of clamping-mandrels or their equivalent, which holds and constitutes an axis for the disk situated in or nearly in the same plane as the aforesaid rollers, upon which axis the disk is capable of rotating while placed edgewise between the rollers and submitted to their rolling action, the axes of said rollers and the axis of the disks being adjustable at different angles to each other, and the rollers having a movement in the line of their axes simultaneously with their rotation, or the axis of the disk having such a movement as to produce such a change in the relative position of the parts as the said movement of the rollers. By the revolution of the disk between the rollers and the last-named movement of the rollers that part of the disk which is to form the sides of the vessel is distended or stretched radially and compressed circumferentially, and at the same time bent to form an angle with that part of the disk which is to form the bottom of the vessel, which last-named part of the disk remains at the end of the process in the same state as at the commencement.

To enable those skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A is a bed-plate supported upon legs or standards B B, and carrying the fixed bed C, the fixed head D, and the adjustable mandrel-carriage E, which is pivoted to the bed-plate by a pivot, *a*, upon which it is capable of horizontal adjustment in a quadrant or other portion of a circle, and should be provided with proper means of securing it in any required position. This carriage E has firmly secured to it the two mandrel-heads F and G, which resemble the two heads of a lathe, carrying the two horizontal mandrels H and H′, which are in line with each other, and capable of turning freely in their respective heads, the mandrel H being also capable of moving longitudinally. The mandrels H H′ carry at their inner or nearest ends the two circular clamps I I′, between which the disk of metal to be formed into a vessel is held. These clamps are of a size equal to or not much smaller than the intended diameter of the bottom of the vessel, and in order to hold the disk securely the clamp I, which is next that side of the disk which is to form the outside of the vessel, is made with a slightly-concave face, and the opposite clamp, I′, with a corresponding slightly-convex face. The disk is placed between the clamps while the mandrel H is drawn back to open them, and is secured by driving the said mandrel forcibly up toward it, and there-

by causing the clamp I to force it hard up against the clamp I, whose mandrel H′ is prevented moving longitudinally by a set-screw, J. The force applied to the mandrel H for the above purpose may be sufficient to give that part of the plate between the clamps the form of the faces of the said clamps, which will give the vessel a convex bottom; otherwise the disk must be first submitted to the action of some suitable means from which the said part receives the shape of the clamps. The means which I have shown of forcing up and securing the mandrel H consist only of a metal strap, T, attached to the mandrel-head F, so as to be capable of swinging over the rear end of the mandrel, and carrying a screw, K, which bears upon the said end of the mandrel. The position of the disk when secured between the clamps is such that if continued in a plane it would intersect the axis of the pivot *a*, upon which the mandrel-carriage E moves.

The means by which the disk is held having been now described, the description of the rollers and machinery for rolling and drawing out the sides of the vessel will be proceeded with. The fixed bed C has slides *b b* at the top, to which are fitted a sliding carriage, L, which may be termed the "roller-carriage," containing the bearings of and carrying the two parallel horizontal shafts M N of the rollers O O′. The axes of these shafts are at the same distance from the bed-plate, and therefore in the same plane as those of the mandrels H H′. The position of the said shafts is such that if the clamp-mandrels H H′ occupied a position at right angles to them a flat disk held between the clamps would enter between the rollers if the latter were moved to a proper position in the lines of their axes. The rollers O O′ are of unequal diameter, the former, which is to roll the inner surface of the vessel, being small in order that it may work between the mandrel H′ and the side of the vessel, but the latter requiring no limit to its size. Their shafts are geared together by spur-wheels *c d*, whose pitch-circles are of a diameter proportioned to the rollers, in order that the peripheries of both may have the same velocity. The peripheries of the rollers are very narrow and made slightly conical. This conical form, or a rounded form, is especially necessary to the outside roller, O′, for a reason which can be better explained hereinafter. The shaft M of the roller O does not extend farther from the right-hand end of the roller-carriage L than is necessary to carry the spur-wheel *c*, but the shaft N of the roller O′ extends as far as the fixed head D, and this extended part is fitted with a feather, *e*, (see Fig. 1,) and groove to a small spur-wheel, *f*, whose hub is made long to form a journal to fit a bearing in the head D. This wheel *f* gears with a larger wheel, *g*, on the main shaft P of the machine, and thus transmits motion to the rollers. The roller-carriage L has secured to its under side a nut which fits to a screw, Q, turning in bearings in the fixed bed C, and hence is caused to receive a slow motion along the slides *b b* by the rotary motion which is transmitted to the said screw by a small spur-wheel, *h*, on the driving-shaft gearing with an intermediate spur-wheel, *i*, which gears with a spur-wheel, *j*, fast on the end of the screw.

In proceeding to operate with the machine the mandrel-carriage is adjusted to bring the clamp-mandrels H H′ to such a position as to form angles of about sixty-five degrees and one hundred and fifteen degrees with the roller-shafts M N, as shown in Figs. 1 and 4, and thus secured, and the rollers are adjusted at a proper distance apart by the screws *l*, which act upon the movable bearings *m* of the roller O′. The roller-carriage is then moved toward the mandrels till the rollers arrive close to or as close as may be desirable to the clamps. The disk is then inserted between the clamps and entered between the rollers, as is shown in Fig. 4, where the strong red line represents the disk in section. This representation of the position of the disk explains the necessity of the before-mentioned beveled or rounded form of the periphery of the roller O′, without which the disk could not pass it in an oblique direction. When the disk is secured, motion may be given to the main shaft of the machine in such a direction the action of the screw Q will be to draw the roller-carriage from the mandrels. The rollers O O′ have a rotary motion at about such a speed as is usual for rollers of similar size employed in rolling metal, and at the same time have a very slow movement in the direction of their axes. The rotation of the rollers causes the disk and its mandrels to rotate. As the motion continues, the effect of the movement of the rollers in the line of their axes is to draw that portion of the disk which is left outside the clamps to form the sides of the vessel in a direction parallel with the said movement, as indicated by a strong red line in Fig. 1 and a dotted red line in Fig. 4, and this drawing being kept up continuously all round gives the aforesaid portion of the disk the form of a frustum of a cone. The combined effect of the rotary and rectilinear movements of the rollers is such as to draw out the metal toward the edges of the disk to a sufficient degree to produce the circumferential contraction without which the conical form could not be produced, and the continuous rolling action upon the metal keeps the particles so compressed together that its texture or density is not injured. As soon as the rollers have run out to the edge of the disk, the latter may be released from the clamps and taken from the machine, after which the rollers may be run up again to the clamps. When a number of similar vessels are to be made by the same machine, as will usually be the case, it will save time to bring them all to the form above described by the same operation before altering the position of the mandrel-carriage to proceed farther with a single disk. After this has been done, the mandrel-carriage may be moved as far as is consid-

ered desirable in the direction of the arrow shown in Fig. 1, and again secured, and the partly-formed vessels, after having been annealed, are again submitted to an operation precisely similar to that already described, by which they will have their sides drawn up to form a more acute angle with the bottom. The operation will require to be performed three or four times, and sometimes, perhaps oftener, shifting the mandrel-carriage in the direction described, and annealing the vessels before every new operation. The vessel becomes less conical by every operation, and may finally be brought to a cylindrical form.

In order to produce the last-named form, the clamping-mandrels will require to be brought parallel with the roller-shafts, and the roller O must be of a diameter less than the space between the mandrel and the sides of the pan.

Kettles or other vessels made by this machine are superior to those made by any of the processes heretofore employed, as the whole of the bottom is preserved in the state in which it was at the commencement of the operation, which is not the case in kettles made by any of the other processes, by all of which the bottom is to some extent stretched and its thickness and strength reduced. There will be no difficulty in so regulating the rotary and rectilinear movements of the rollers that the distention of the metal toward the edges shall be such as to preserve a uniform thickness. The sides of the kettle being actually rolled out into shape between two rollers, in the same way as a flat sheet is rolled, possess all the desirable qualities of rolled metal.

The adjustments and operation of the parts of the machine may be changed so far that the movement to carry the rollers from the bottom to the edges of the vessel may be given to the mandrel-carriage instead of the roller-carriage, and the movement to change the angle of the mandrels and the rollers may be given to the roller-carriage instead of the mandrel-carriage.

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

The employment of a pair of rollers, O O′, in combination with a pair of clamps, I I′, or their equivalent, all arranged, adjusted, and operating substantially in the manner described, for the purpose of operating upon a disk of brass or other metal to roll out the said disk from a certain distance all around its center to its edges, and bend or draw the part so rolled to form an angle with the central part, and cause it to be distended radially or toward the edges, and to be contracted circumferentially thereby, forming the said disk by successive stages into a kettle or vessel or other similar article with conical or cylindrical sides without employing a mold or form, as herein fully set forth.

LYMAN C. CAMP.

Witnesses:

I. H. BARTHOLOMEW,

G. P. COWLES.