(No Model.)

A. WILBUR.

FLANGING MACHINE.

No. 274,872. Patented Mar. 27, 1883.

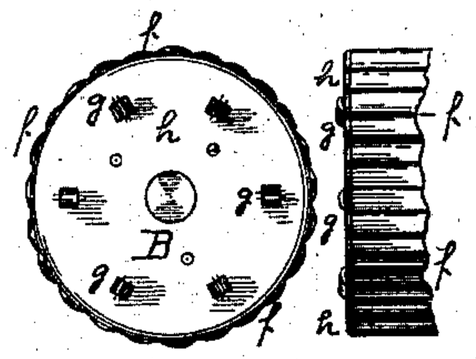

Fig. 3.

Fig. 4.

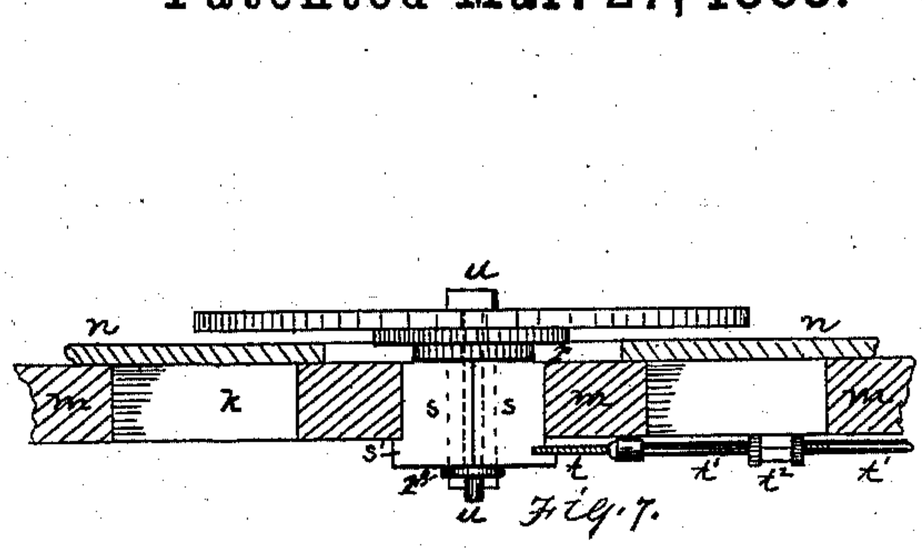

Fig. 7.

Fig. 1.

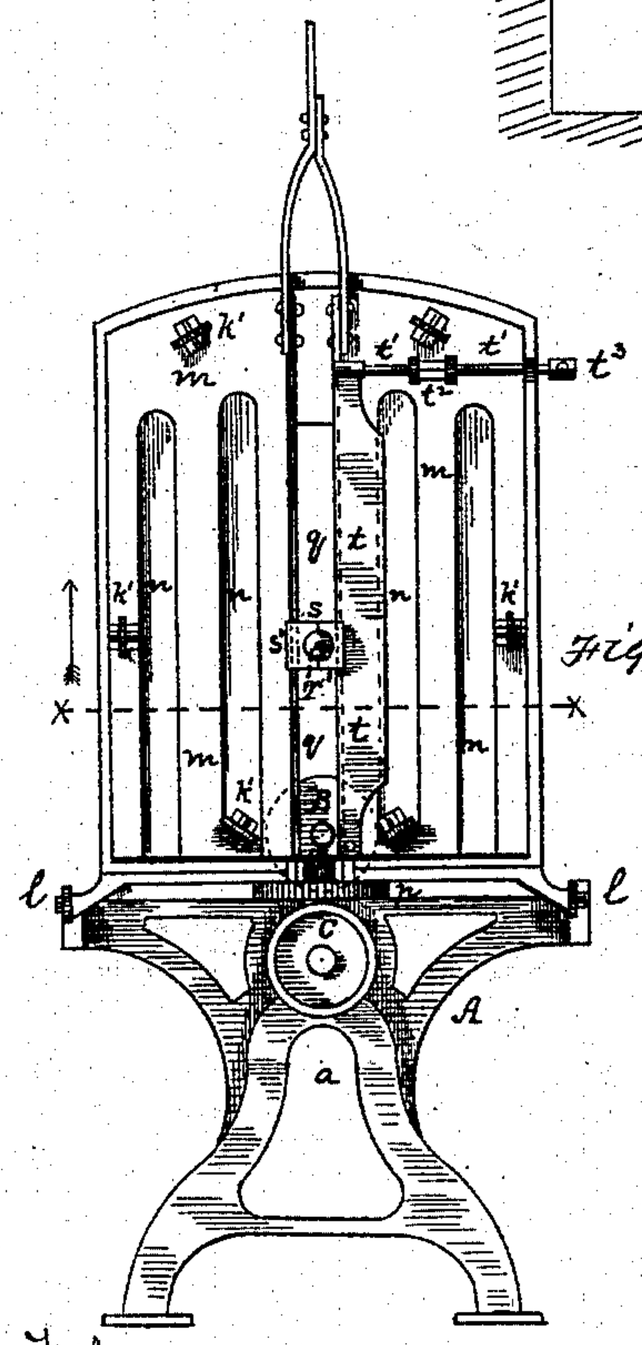

Fig. 2.

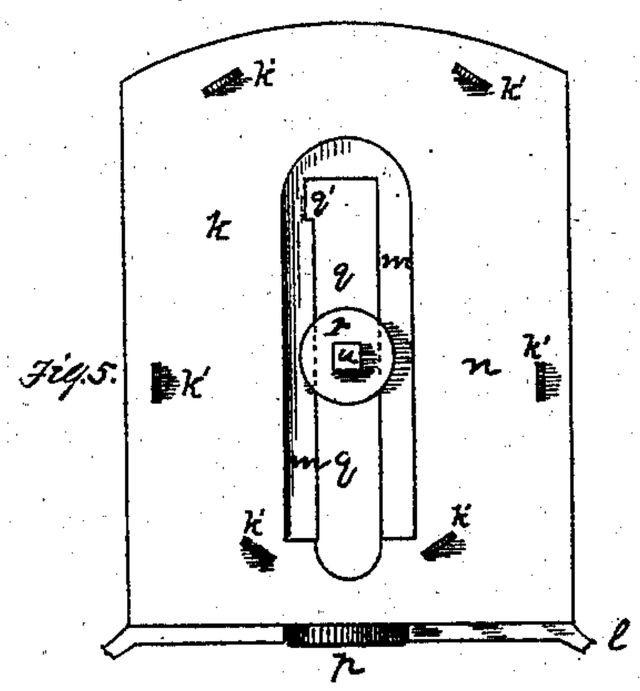

Fig. 5.

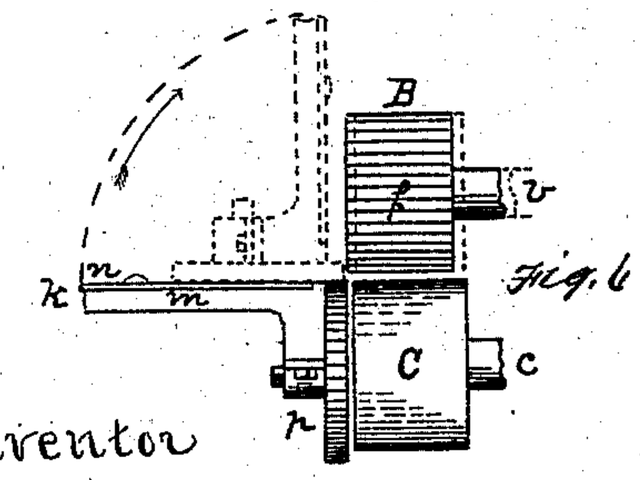

Fig. 6.

Witnesses

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ALFRED WILBUR, OF ALLEGHENY, PENNSYLVANIA.

FLANGING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 274,872, dated March 27, 1883.

Application filed March 14, 1882. (No model.)

To all whom it may concern:

Be it known that I, ALFRED WILBUR, of Allegheny, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Flanging-Machines; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming a part of this specification, in which—

Figure 1 is a side view of my improved flanging-machine, the shifting table being raised and the finished flanged plate being shown in section. Fig. 2 is a front view of the machine, the shifting table being raised to show the operative parts on its under surface. Figs. 3 and 4 are face and side views of the upper flanging-roll, showing its construction. Fig. 5 is a face view of the shifting table. Fig. 6 is a diagram view, illustrating the operation of the rolls and shifting table in forming a flange; and Fig. 7 is a cross-section of the shifting table on the line *x x* of Fig. 2.

Like letters of reference indicate like parts in each.

My invention relates to machines for forming flanges around circular plates of metal—such as boiler-heads and like articles—it being usually termed "outside flanging." The usual construction of machines for this purpose consists of a pair of rolls mounted in the same vertical plane and extending out from the frame or housing, and a shifting table or platform pivoted in front of the rolls and having mounted thereon a revolving disk adjustable longitudinally on the table. The circular metal plate is secured to the disk so that its edge extends between the rolls, and the rolls are then rotated and the table gradually raised, so that the rolls, biting on the edge of the plate, gradually bend it over, forming the flange around the plate, extending out therefrom at whatever angle desired.

Difficulty has been experienced in connection with the operation of different parts of these machines as heretofore constructed, some of these difficulties being that, as the flanging-rolls were necessarily pressed down tight on the plate in order to cause its rotation, they had a tendency to reduce and elongate the edge operated on and to cause it to buckle. The upper roll had also to be adjusted before the operation of flanging to the different thicknesses of metal plates flanged on the machine, and great friction was created between the flat surface of this roll and the plate, if pressed against it, so that it was difficult to form a perfect flange, and the flat face of the upper roll had a tendency to mar or score the surface of the plate operated upon. The disk would also become heated and swell in its bearing, and, as it was held by a nut below the table, was difficult to remove.

The object of my invention is to overcome these difficulties and to improve the construction of the machine, so as to enable it, among other things, to perform more perfect work and operate with less power.

My invention consists, first, in having the axis of the upper flanging-roll free to move endwise against the resistance of a spring-weight or other device to force it up to its work, so that it may be pressed back by the metal plate operated upon as the table to which it is attached is raised, and thus accommodate itself to the thickness of the plate; second, in forming a series of slight corrugations on the periphery of the upper flanging-roll, extending longitudinally across it, to allow the metal in the flange to thicken up as it is bent over, and thus prevent its buckling; third, in providing the upper roll with a hard-steel front or face, removably secured thereto to receive the principal wear, and thus render the roll more durable; fourth, in providing the front or flat face of this roll with a series of friction-rollers to overcome the friction between the roll-face and the metal plate pressed against it; fifth, in providing the shifting table with a large idle-roller opposite the lower flanging-roll, to hold the metal up against and press back the upper flanging-roll as the table is raised; and, finally, in other details of construction hereinafter specifically set forth.

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

In the drawings referred to, A represents the frame or housings of my improved machine, having the standards *a a'* and cross-braces a^2. In front of the standard *a* are mounted the two flanging-rolls B C, their shafts *b c* being journaled in the standards one above the other, the journal-boxes of the

lower-roll shaft *c* resting in seats in the standards and those of the upper-roll shaft *b* being supported above them on coil-springs, and the pressure of the rolls being regulated by adjusting-screws passing through the standards and pressing against the journal-boxes of the upper-roll shafts. The shafts *b c* are connected by pinions *b' c'*, and power is communicated to the rolls from the power-belt *d* through pulley *d'* and cog-wheels d^2 d^3. The upper-roll shaft *b* has a slight longitudinal movement in its bearings as well as a rotary motion therein, the shaft or axis of the roll being free to move endwise, and between its rear journal-box and the pinion *b'* or other suitable stop thereon is the spiral spring *e*, which, by pressing on the pinion or stop, holds the roll B in its forward position, and yet yields to any longitudinal pressure against the roll, and thus enables it to accommodate itself to any thickness of plate operated upon without any special adjustment of the roll. The force of the spring is regulated so as to hold the roll tight against the plate and enable it to form a neat and properly bent flange. Instead of the spring *e*, any other equivalent means for cushioning the roll—such as lever mechanism, a weight, or an air-cushion—may be employed to accomplish the same result. The rolls are formed of cast metal, and the periphery of the lower roll is plain, it being generally made of the same diameter throughout and its front edge being square. The upper roll is provided with a hardened steel face, *h*, which provides a hardened rim around its forward edge at the point which is subjected to the heaviest wear. This hardened-steel face is removably secured to the roll, it being bolted or screwed thereon, and it can be removed and replaced when worn, thus doubling or trebling the durability of the roll. The forward edge of the roll is curved according to the curve to be imparted to the bend or angle of the plate, and the curved or beveled edge may be formed entirely on the removable steel face. The upper roll, B, is provided with slight depressions, extending longitudinally across its periphery, forming the corrugated surface *f*, and this corrugated surface enables the roll to catch upon the metal plate without being screwed down so tightly, as well as serves to crimp the inner side of the flange as it is bent up, and aid its thickening up regularly around the entire flange, overcoming entirely its liability to buckle.

In order to prevent any friction between the metal plate operated on and the flat face of the roll B and the scoring of the plate by the roll, a series of friction-rollers, *g*, are sunken into this roll and extend slightly beyond its face, and the metal plate presses against these rollers when bent up against the roll, so that the rotation of the roll is in no way impeded by the plate, and the plate is held out from the roll by the friction-rollers. The rollers *g* are easily secured in place by means of the hardened-steel face *h*.

The shifting table or platform *k* is pivoted at *l l* either to the standard *a* of the frame or to a separate standard in front of it. It is formed of the cast-metal body *m*, and the wrought-metal plate or cover *n*, secured thereto, being constructed in this manner to lighten it and prevent its fracture by falling or by any heavy weight dropping upon it, as has frequently been the case where the table is formed entirely of cast metal. I have found that by this construction of table its weight is reduced at least one-half, and the wrought-metal face so braces the cast-metal body as to greatly lessen its liability to fracture, while the cast-metal body imparts to the table its necessary rigidity.

Mounted in suitable bearings at the front of the table *k*, opposite and having its periphery level with the lower roll, C, is the large idle-roller *p*. This roller is so mounted that its edge is on the pivotal line of the table, and it supports the metal plate in front of the rolls and presses it up against the curved or beveled edge of the upper roller as the table is raised, so that the metal at the curve of the plate is confined between this roller and the upper roll, while the flange is between the two rolls. It thus supports and presses the metal to place and forms a true and regular curve, conforming in shape to the curved edge of the upper roll. The shifting table is also provided with a series of small idle-rollers, *k'*, at different points around the table, these rollers serving, in conjunction with the large roller *p*, to support the plate held on the revolving disk above the table and permit its easy movement thereon.

Extending longitudinally along the center of the table is the slot *q*, in which the revolving disk *r* is mounted, being slid along this slot to adjust it to the size of the metal plate to be operated upon. This disk *r* has a cylindrical extension or arbor extending from it through a journal-box, *s*, and an annular flange, *r'*, at the base of the cylindrical extension to retain it within the journal-box. The journal-box *s* is made in two halves, which fit around the cylindrical extension of the disk, and one part of which has a lip, *s'*, fitting under one side of the slot *q*.

Underneath the table, and having one end pivoted at the back of the table, is the bearing-bar *t*, the bearing-face of which extends along the slot *q* and fits within a recess on the side of the journal-box, pressing the box between it and one side of the slot. The other end of the bar *t* fits around the screw-bar *t'*, the threaded portion of which extends through a nut, t^2, secured to the under surface of the table, and the head t^3 of which extends out to the side of the table in convenient position for turning. When it is desired to move the disk *r* the screw is loosened, thus relieving the pressure of the bar *t* on the journal-box; and the disk will then slide freely to whatever position desired, in which position it can be securely held by tightening up the screw, thus clamping the journal-box between the bearing-bar

and the opposite side of the slot *q*. If the arbor of the disk is expanded by the heat of the plate secured to it, by slipping the partible box along to one end of the slot, where an enlargement, *q'*, is formed in the slot, it can be raised out of the table and opened, when the disk may be removed. The plate to be operated upon is secured to the disk by a bolt, *u*, passing through the center of the disk and locked underneath the table.

The shifting table *k* may be raised in any desired way, by power applied either beneath or above the table. The means preferred by me is a chain or wire rope, k^2, attached to the end of the table and passing over a pulley (not shown) supported above and back of the machine, and from thence to a windlass or spool, *j*, mounted back of the frame A and operated from the power-belt *d* through the pinions *v v'* and clutch *w*. The table can be gradually lowered by means of a brake on the windlass or spool.

The operation of my improved flanging-machine is as follows: The upper flanging-roll, B, may either be mounted slightly forward of the lower roll, C, so that when pressed back, as hereinafter described, its face is even with that of the lower roll; or the faces of the rolls may be even and the upper roll be pressed back of the lower roll. The circular plate to be flanged is brought to the proper heat and then placed on the shifting table, its edge extending between the flanging-rolls B C and a bolt passing through a hole in the center of the plate, and securing it to the disk *r*. The rolls are then screwed down on the plate and set in motion. The table is then gradually raised, and as the rolls bite upon the edge of the plate they bend it over, forming the flange around it. On account of the corrugated surface of the upper roll, it catches upon the plate and causes its rotation without the rolls binding too tightly upon it, so that the rolls have no tendency to reduce or elongate the edge, and the corrugated surface of the roll also crimps the inner surface of the flange at regular intervals, and thus aids it in thickening up and taking up all the excess of metal caused by the bending over of the flange, and overcomes all tendency to buckle. This crimped inner surface of the plate can be rolled off by permitting the rotation of the plate a short time after the flange is formed. During the bending of the flange the idle-roller *p* on the shifting-table, pressing against the outer surface of the plate, confines it between the roller and the upper roll and holds the plate up against the roll, so that the plate conforms exactly to the curved edge of the upper roll, thus forming an evenly bent flange around the entire plate. As it and the small idle-rollers *k'* travel with the plate, they also overcome all friction between the plate and the table. When the plate is bent up against the face of the upper roll the pressure of the large idle-roller presses the upper roll back the thickness of the plate, the spring *e* on the roll-shaft *b* permitting the roll to accommodate itself to the thickness of the plate, and thus doing away with any special adjustment of the roll, according to the thickness of the plate operated upon. When the plate is pressed against the face of the upper roll all friction between the plate and roll or scoring of the plate by the roll is prevented by the idle-rollers *g* on the face of the roll. As the weight of the shifting table is reduced, and as the rolls do not bind tightly on the plate, and all unnecessary friction between the plate and machine is prevented, a large reduction in the power required to operate the machine is consequently obtained.

When it is desired to adjust the table to plates of a different diameter all that is necessary is to loosen the screw-bar *t'*, removing the pressure of the bearing-bar *t*, when the disk can be slid to whatever position desired and again locked in that position by the bearing-bar. If the arbor of the disk *r* should become so expanded by the heat from the plate that it will not rotate freely, the disk can be easily exchanged for another by sliding it to the end of the slot, removing it therefrom, and opening the partible box *s*.

I have described my improved apparatus in connection with a machine in which the flanging-rolls are mounted in a stationary frame and the table supporting the plate is raised to hem the flange. It is evident, however, that the improvements are applicable to machines in which the shifting table moves in another direction; or the rolls themselves are mounted in a shifting frame. The relative position of the apparatus as claimed by me would of course be changed in these constructions of machines, and when so used are considered equally within my invention.

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

1. In flanging-machines, the combination, with the two flanging-rolls B C, the shaft of the upper roll, B, being longitudinally movable in its bearings, of the spring *e*, or a weight or equivalent mechanism, substantially as and for the purposes set forth.

2. In machines for flanging circular metal plates, the combination of the rotary flanging-rolls B C, the upper flanging-roll, B, having its shaft or axis free to move endwise against the resistance of a spring, weight, or other mechanism applied to force it up to its work, and the pivoted shifting table *k*, said table being adapted, when raised, to press back the upper roll and cause it to accommodate itself to the thickness of the plate flanged, substantially as set forth.

3. In machines for flanging circular metal plates, the combination of the rotary flanging-rolls B C, in which the upper roll, B, is provided with a series of slight corrugations, *f*, extending longitudinally across its periphery to catch upon the metal and aid its thickening up as the flange is bent, substantially as set forth.

4. In flanging-machines, the upper flanging-

roll, formed of cast metal, and having the removable hardened-steel front or face *h*, substantially as and for the purposes set forth.

5. In flanging-machines, the upper flanging-roll having a series of friction-rollers on its front or face, substantially as and for the purposes set forth.

6. In flanging-machines, the pivoted shifting table, formed of the cast-metal body and wrought-metal top or cover secured thereto, substantially as and for the purposes set forth.

7. In machines for flanging circular metal plates, the combination of the rotary flanging-rolls B C, the upper flanging-roll, B, having its shaft or axis free to move endwise against the resistance of a spring, weight, or other mechanism to force it up to its work, and the pivoted shifting table *k*, carrying the large idle-roller *p*, mounted therein opposite the lower flanging-roll, said idle-roller being adapted, on the raising of the table, to press back the upper roll and cause it to accommodate itself to the thickness of the plate flanged, substantially as set forth.

8. In flanging-machines, the combination, with two flanging-rolls, B C, of the pivoted shifting table *k*, having the large idle-roller *p* mounted therein opposite the lower flanging-roll and series of idle-rollers *k'*, and the disk *r*, longitudinally adjustable in said table, substantially as and for the purposes set forth.

9. The combination of the disk *r*, mounted in a journal-box, *s*, within the longitudinal slot *q* of the shifting table, with the bearing-bar *t*, extending along said slot and adapted to clamp the journal-box against the side of the slot, substantially as set forth.

10. In combination, with the table having the longitudinal slot *q*, the rotary disk *r* and partible journal-box *s*, fitting around the arbor of said disk and sliding within the slot of the table, substantially as and for the purposes set forth.

In testimony whereof I, the said ALFRED WILBUR, have hereunto set my hand.

ALFRED WILBUR.

Witnesses:
F. G. KAY,
JAMES I. KAY.