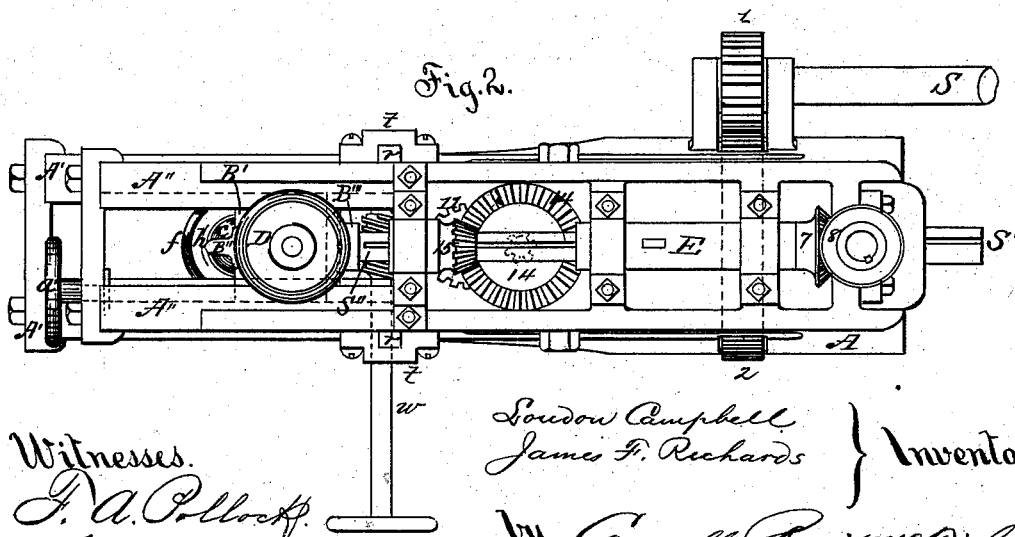
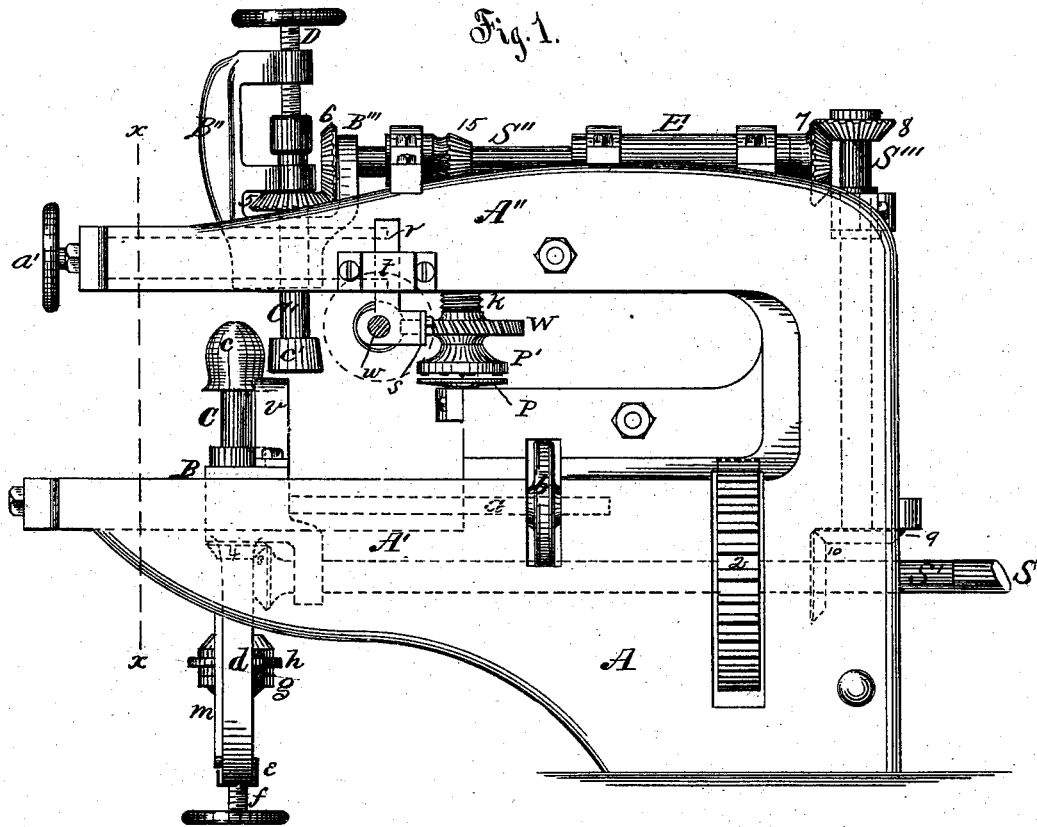


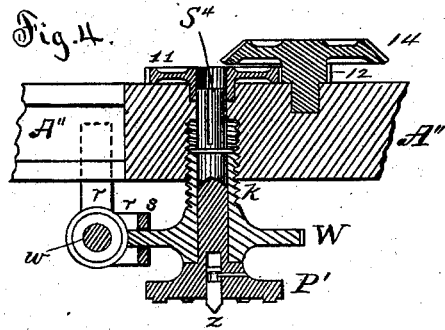
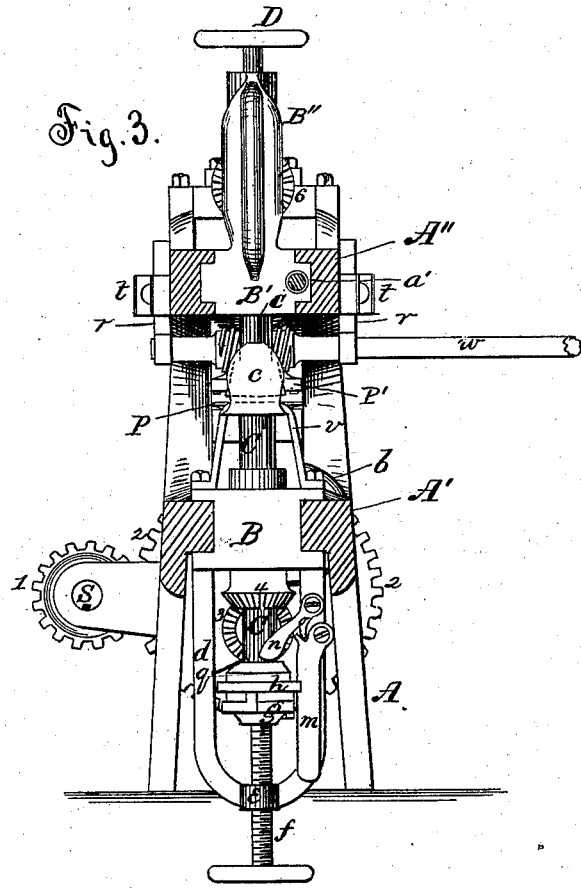
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Machine for Flanging Boiler-Heads.
No. 205,241. Patented June 25, 1878.



Witnesses.
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UNITED STATES PATENT OFFICE.

LOUDON CAMPBELL AND JAMES F. RICHARDS, OF PITTSBURG, PA.

IMPROVEMENT IN MACHINES FOR FLANGING BOILER-HEADS.

Specification forming part of Letters Patent No. 205,241, dated June 25, 1878; application filed April 27, 1878.

To all whom it may concern:

Be it known that we, LOUDON CAMPBELL and JAMES F. RICHARDS, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Machines for Flanging Boiler-Heads; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

Figure 1 is a side elevation; Fig. 2, a plan; Fig. 3, a section on line *xx* of Fig. 1; and Fig. 4, a detail section, showing arrangement for clamping and revolving the plate.

This invention relates to machines for flanging the outer edge of boiler-heads; and consists in the construction and combination of parts, substantially as hereinafter fully described and claimed.

The main difficulty met with in machines of this class lies in the fact that a large circumference must be reduced to a smaller one, requiring the upsetting of the metal, which is very apt to "buckle" the plate and form corrugations on the flange, rendering it necessary to finish by hand.

The methods adopted to overcome these difficulties are various, some clamping the plate with its edge between driven rolls, the plate loosely revolving by friction, and being gradually canted to a right angle, some having the clamped plate driven and the rolls operated by friction and canted up gradually to a right angle; but in all something is wanting. The movable parts meet with so much strain that the operation cannot be uniform and smooth; hence the plate must come out imperfect, and requires going over by hand. We, however, clamp the plate and give it positive revolution, and also give positive motion to the flanging devices, all independently and at a relatively uniform speed, so that the combined operation is smooth and even, producing at once a perfect plate, which requires no hand-finishing or "ball-hammering" to face out irregularities.

Our invention is as follows: A designates

the body of the machine, having the overhanging parallel shears *A' A''*, of such dimensions as the work requires, and is cast in two longitudinal halves, and bolted together, as shown. In shears *A'* slides a cross-head, *B*, adjusted back and forth by a screw, *a*, passing through the threaded hub of a hand-wheel, *b*, collared in shears *A'*, and projecting through a slot therein, as shown. Bearing vertically through cross-head *B* is a shaft, *C*, or mandrel, having keyed at its upper end a forming-roll, *c*, or former of peculiar shape. Its top is conical or rounded, so that in rising against the plate it tends to bend its edge upward. Its middle portion recedes slightly, as shown, so that under the outward spring of shaft *C* with the strain, the re-entrant line becomes vertical and flanges to a true right angle. Below the former swells outwardly in a curve, for use in rounding off the flange to any required degree.

The manner of automatically feeding former *c* up to work and the construction of parts are the same as shown and described in Letters Patent No. 201,325, granted to us for inside-flanging machines, except that we do away with the spring-catch on the loose collar and substitute a device for automatically throwing off the feed at the proper point. As in the patent referred to, we have the suspended arch *d* on the cross-head *B*, threaded bearing *e*, and feed-screw *f*, whose notched head revolves in a fixed collar, *g*, attached to the base of shaft *C*, and provided with a spring-dog, and the loose collar *h*, having the cam-face, all as described in said patent; but we make a notch in the periphery of loose collar *h*, and to arch *d* we pivot a catch-bar, *m*, so as to normally gravitate against the collar *h* and engage in its notch. So long as such engagement lasts the former is gradually fed upward to its work. A free pawl, *n*, is loosely pivoted to the arch, so that its lower edge overhangs the upper edge of the collar *g*, and a detent, *o*, projects into a notch in the bar *m*. Now, when former *c* has risen as far as it should go a stud, *q*, projecting on collar *g* strikes and lifts the pawl *n*, whose detent *o* then forces the catch-bar *m* out of the notch of the collar *h*, which then revolves and prevents any further feed of shaft *C*.

Journalled in bearing-lugs on the side of body A is the main shaft S, on which is keyed a pinion, 1, which meshes with large gear 2 within body A, set with spline and groove on a counter-shaft, S', which runs longitudinally under shears A', and carries at its end a miter-gear, 3, which meshes with a miter-gear, 4, attached to a sleeve which surrounds shaft C, and fits it by spline and groove, and through this system of connections the motion of shaft S is communicated to shaft C, while the latter may also rise vertically while revolved.

Sliding in shears A'' is a cross-head, B', having the extensions B'' B'''. Bearing upward through cross-head B', so as to slightly lean out of a vertical line in the direction of the outer end of shears A'', is a shaft, C', having its lower end enlarged into the resisting-roller *c'*, whose periphery is inclined to rectify the axial inclination of shaft C'—that is, the face or periphery of roller *c'* is conoidal, and at the part nearest the former *c* is about vertical. The purpose of this inclination is to have only the outer edge of the roller *c'* bear upon the plate, to avoid the opposing tendency of its opposite edge, if also allowed to bear upon the plate and grind. A feed-screw, D, passes down through the threaded bearing afforded by extension B'', and is swiveled to shaft C'. Attached by spline and groove to shaft C' is a miter-gear, 5, meshing with a similar gear, 6, journalled in the extension B''', and keyed on the end of the horizontal shaft S'', which passes along in proper bearings on shears A''. Thus shaft C', cross-head B', its extensions B'' B''', gears 5 and 6, and shaft S'' form one connected system, which is adjustable lengthwise by a feed-screw, *a'*, collared in the end plate of the shears and threading into the cross-head B'. To permit this, shaft S'' plays by spline and groove in a long collar, E, or sleeve, from which it receives motion. On the end of sleeve E is a miter-gear, 7, meshing with another, 8, keyed on the vertical shaft S''', which receives motion from counter-shaft S'' by means of the miter-gears 9 and 10. By the above arrangements, both former *c* and the resisting-roller *c'* receive positive independent motion, while both are capable of vertical and lateral adjustment.

The plate is laid on a horizontal table, P, journalled in shears A', as shown. It is clamped by a presser-foot, P', which forms the lower end of a vertical shaft, S⁴, which passes up through a sleeve, *k*, screwing up and down in the shears A'', and is held by a collar above the sleeve. In one piece with the sleeve *k*, or fixed thereto, is a worm-wheel, W, and thus any motion of wheel W raises or lowers sleeve *k*, and with it shaft S⁴ and presser-foot P'. Shaft S⁴ passes up by spline and groove into the hub of a gear-wheel, 11, journalled in the shears, which meshes with a pinion, 12, on the hub of a beveled gear, 14, meshing with a beveled spur, 15, fitted by spline and groove on

shaft S'', so that the revolution of shaft S'' causes that of shaft S⁴, its presser-foot P', and the plate clamped between it and table P. The presser-foot has several studs on its face, which sink slightly into the plate and gripe it firmly. Precision in setting the plate is insured by the gravitating center-pin *z*, which plays vertically in a recess in the center of the presser-foot, where it is retained by a lateral pin, as shown in Fig. 4.

The presser-foot and its shaft are fed up and down by the rotation of the worm-wheel W, which is effected by the worm on shaft *w*, bearing in the guides *r*, having attached to them a slotted plate, *s*, in whose slot extends the edge of wheel W, so that when wheel W, in revolving, is raised or lowered, plate *s*, shaft *w*, and sliding bearings *r r* all move with it, for the accuracy of which movement the bearings *r* slide in the brackets *t* on shears A'', as shown. Shaft *w* extends out some distance, in order that the red-hot plate may be readily clamped by the workmen without close approach to it. When so clamped, the resisting-roller *c'* is lowered till it presses firmly upon the plate, which is supported underneath by a rest or platform, *v*, fitting closely to the former *c*. The latter is then adjusted so that its conical surface is under the edge of the plate. Then motion is given to the shaft S, which puts all the parts in operation, former *c*, roller *c'*, and the plate all uniformly revolving, while former *c* slowly rises and bends and upsets the edge of the plate into a smooth and perfect flange, without buckling the body of the plate.

We claim as our invention—

1. In a flanging-machine, the combination, with revoluble table P and a rest, *v*, for the plate, of the vertical pressure-roller *c'*, having positive independent motion, and a revolving former, *c*, having positive independent motion and capable of vertical feed, substantially as described.

2. In a flanging-machine, the combination, with revolving table P and a rest, *v*, for the plate, of the vertical pressure-roller *c'*, having positive independent motion and capable of lateral adjustment, and a revolving former, *c*, having positive independent motion and capable of both vertical and lateral adjustment, substantially as described.

3. In combination, a revolving former, *c*, and a vertical pressure-roller, *c'*, having its periphery axially inclined, the pressure-roller *c'* being so inclined, substantially as described, as to bear upon a plate only on that side of its axis next to the former *c*, as and for the purpose shown.

4. The combination of presser-foot P' with its shaft S⁴, collared and grooved, as shown, threaded sleeve *k*, shears A'', splined gear 11, pinion 12, gear 14, spur 15, and shaft S'', as described.

5. The combination of sleeve *k*, shears A'', worm-wheel W, worm-shaft *w*, plate *s*, sliding

bearings *r*, and brackets *t*, substantially as specified.

6. The combination of notched loose collar *h*, fixed collar *g*, with the described stud on its upper surface, pivoted pawl *n*, having detent *o*, pivoted catch-bar *m*, having notch for the detent, with the shaft *C*, former *c*, and notched-headed feed-screw *f*, substantially as described.

In testimony that we claim the foregoing as our own we affix our signatures in presence of two witnesses.

LOUDON CAMPBELL.
JAMES F. RICHARDS.

Witnesses:

F. A. POLLOCK,
THOS. J. MCTIGHE.