(No Model.) 3 Sheets—Sheet 1.

Z. E. COFFIN.

MACHINE FOR DRILLING PIPE FLANGES.

No. 272,857. Patented Feb. 27, 1883.

Fig. 4.

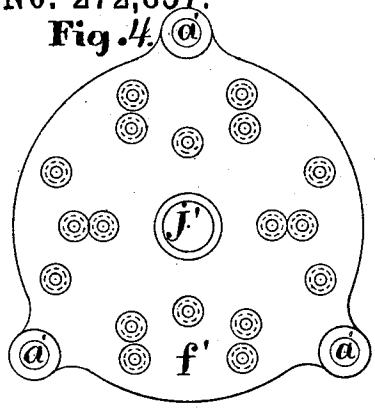
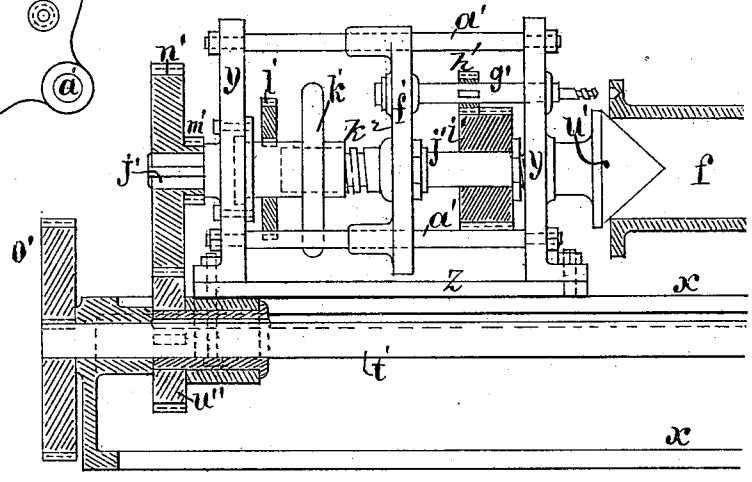


Fig. 2.



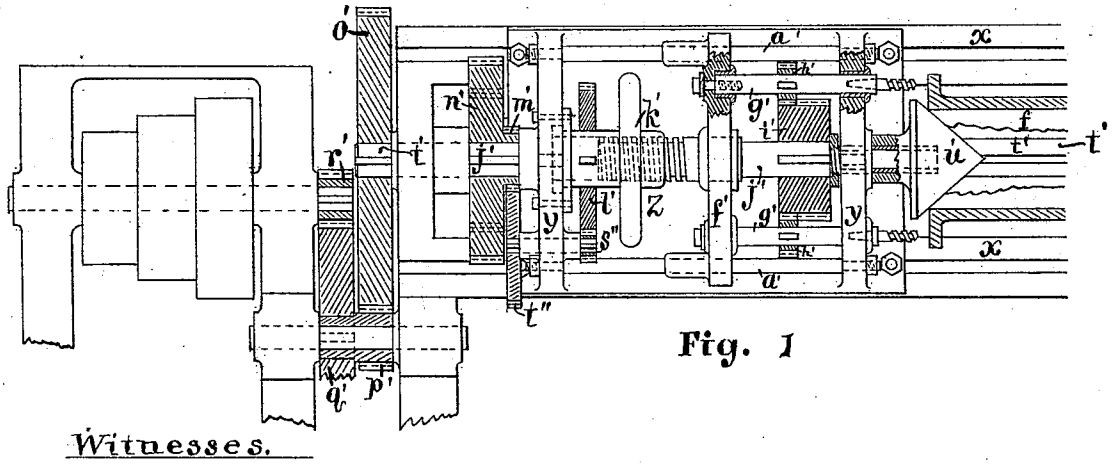


Fig. 1

Witnesses.

D. V. B. Coffin

John H. Stevens

Inventor

Zebulon Enoch Coffin

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 3 Sheets—Sheet 2.

Z. E. COFFIN.

MACHINE FOR DRILLING PIPE FLANGES.

No. 272,857. Patented Feb. 27, 1883.

Fig. 3.

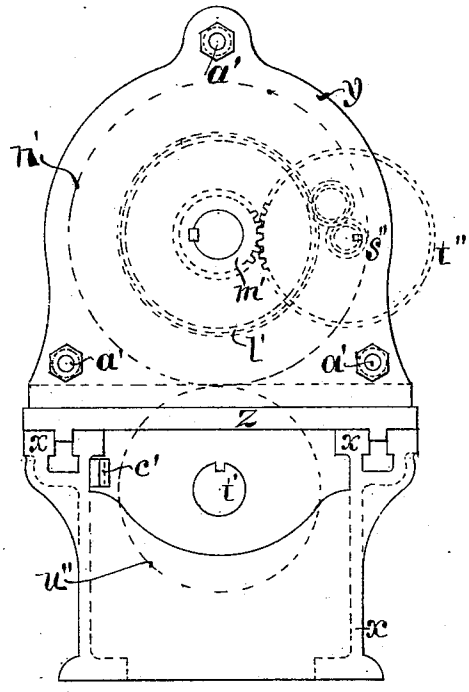
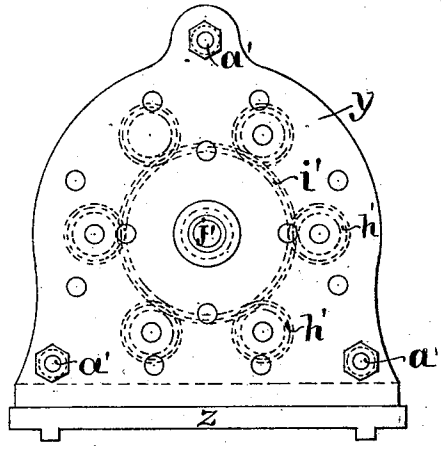


Fig. 5.



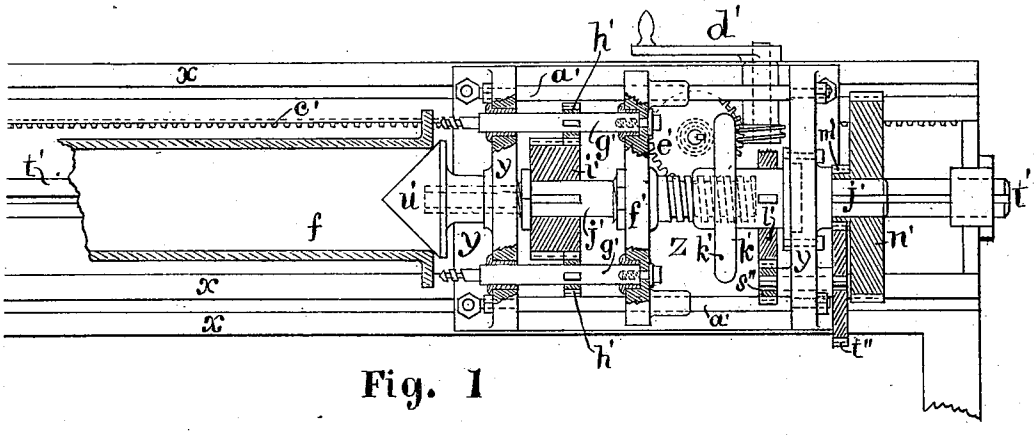


Fig. 1

Witnesses.

D. H. B. Coffin

John H. Stevens

Inventor.

Zebulon Crosby Coffin

N. PETERS, Photo-Lithographer, Washington, D. C.

(No Model.) 3 Sheets—Sheet 3.

Z. E. COFFIN.

MACHINE FOR DRILLING PIPE FLANGES.

No. 272,857. Patented Feb. 27, 1883.

Partial- Elevation.

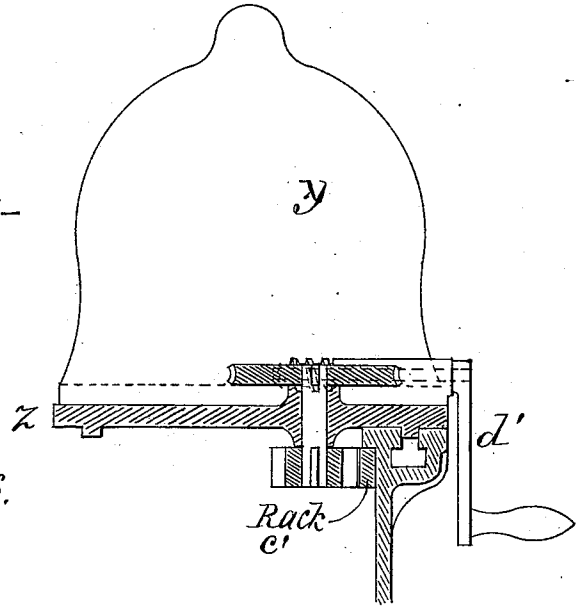
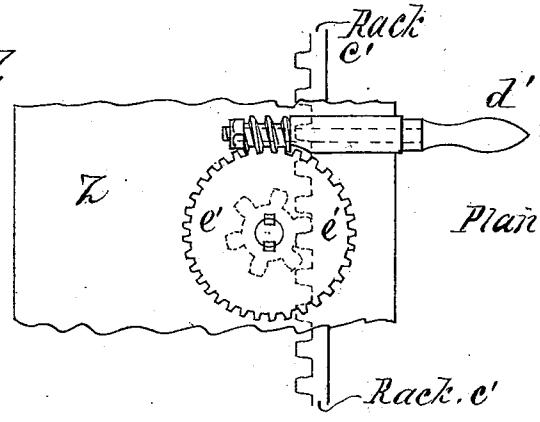


Fig. 6.

Fig. 7.

Partial- Plan.



Witnesses.

James. A. Butler

Richard J. Lombard

Inventor.

Zebulon E. Coffin

per D.N.B. Coffin Atty.

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

ZEBULON E. COFFIN, OF NEWTON, MASSACHUSETTS.

MACHINE FOR DRILLING PIPE-FLANGES.

SPECIFICATION forming part of Letters Patent No. 272,857, dated February 27, 1883.

Application filed January 6, 1882. (No model.)

To all whom it may concern:

Be it known that I, ZEBULON ERASTUS COFFIN, of the city of Newton, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Machines for Drilling the Flanges of Pipes; and I do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

With the ordinary machines now in use it is not practicable to bore all the needful holes in the flanges at both ends of the pipe at one time or operation. It is proposed with the improved machine herein described to do this.

The nature of my invention relates to the general and particular construction of the machine and of its several parts and their combinations, substantially as hereinafter more fully set forth and described.

With reference to the drawings, Figure 1, Sheets 1 and 2, is a plan of the machine partly in section and nearly complete. Fig. 2 is an elevation of the left-hand part of the machine. The right-hand part, being mainly symmetrical and sufficiently shown in the other views, is omitted in this view. Fig. 3 is an end view, with some parts (sufficiently shown elsewhere) omitted. Fig. 4 is an elevation of one of the movable drill-feeding plates, *f'*. Fig. 5 is an elevation of one of the head-stocks or gang-drill frames, omitting the cone *w'*, and viewed from the position of the pipe *f*, in plan. Fig. 6 is a sectional elevation in part, illustrating the hand-gear, rack, and crank for moving the drill-frames along the bed or ways. Fig. 7 is a partial plan, illustrating the same parts. Figs. 3, 4, 5, are drawn on a larger scale than Figs. 1 and 2.

Like letters refer to the same or corresponding parts in all the figures.

With reference to the drawings, *x* is a bed or ways fitted to receive and support two head-stocks or gang-drill frames, Y Z, Y Z. These head-stocks are movable, one or both of them, lengthwise on the bed. They may be securely fastened at any point of adjustment by means of bolts, as shown, whose heads traverse the inverted T-slot shown in the ways or bed. (See Figs. 1, 2, and 3.)

In the drill-frames the drill stocks or arbors are arranged around a common center, which is the center of the main arbor, at points corresponding to the required arrangement of the bolt-holes which are to be drilled. One arbor is provided for each hole to be drilled, and is marked *g'*. All these drill-arbors are driven by a common central gear-wheel, *i'*, into which, directly or by means of an intermediate, the gear *h'* upon each drill-arbor is made to mesh. The central gear, *i'*, is keyed to the central arbor, *j'*, which is driven through gears *n'* and *w''* by a common shaft, *t'*, splined and extending longitudinally in the bed or between the ways. The cones *w'* are secured to the drill-frames. These cones serve to center and hold the pipe for and during the operation of drilling.

A suitable feed and retracting movement for the drills is obtained by means of the hand-wheel nut *k'*, necked into the head-piece of the drill-frames Y, in which it turns freely, said nut operating upon the sleeve-screw k^2, shown in engagement with it. This screw incloses as a sleeve the main arbor, and is attached to the movable feed and retracting plate *f''*, which it forces forward to feed, and backward to retract, the drills. The drill-frames Y are securely connected for each head-stock by the base-piece Z, to which they are bolted, (and with which they also are bolted, as before mentioned, to the bed or ways,) and by the rods *a'*, which also form guides for the feed and retracting plate *f'*.

For the convenience of more easily moving the head-stocks or drill-frames lengthwise of the bed for adjustment to the different lengths of pipes to be bored, one or both of them are furnished with suitable hand-gearing, as shown partly in full and partly in dotted lines. The hand wheel or crank for working this gearing is marked *d'*, and a rack into which the gearing plays is marked *c'*, and appears in Figs. 6 and 7.

Between the crank *d'* and rack *c'* will be noticed the worm and worm-wheel *e'*, connected to which is the pinion which engages the rack *c'* with their shafts.

The drill spindles or arbors *g'* are fitted to rotate in bearings suitably arranged to correspond with the series of bolt-holes to be drilled. These bearings are for the front ends of the

drill-arbors in the upright frame Y and for the rear end in the movable plate f' The drill-arbors have a retaining-head or screw-bolt connection to the movable plate f', by which they are pushed for feed or retracted at pleasure, as above described. The drill-arbors carry the gears h', meshing into the central gear, i'. The gear i' is supplied in different sizes, and the gears h' also may so be.

When changes are made for drilling different sizes of pipe and differing series of holes, it is easily done by unbolting the uprights Y and rods a'. Then the size of gear i' may be changed and the drill-arbors placed in different series of bearings. (See Figs. 4 and 5.) Also, different heads or frames, Y, may be substituted, as also different and corresponding plates f'. But two of the drill-arbors are shown in each of the head-stocks in the plan, Fig. 1; but in Figs. 4 and 5 full sets are indicated for different-sized pipes and different numbers of holes in a series, one set only (in Fig. 5) having the gears indicated in dotted lines. In Fig. 2 one drill-arbor only is shown, and that, for convenience and perspicuity, is placed directly over the central arbor, j', and not to correspond with the other views; and I will here say that in many cases I have not shown all the parts in one view when they were sufficiently otherwise shown or indicated, so to avoid crowding and confusion of parts. The number of drill-arbors and their distances from the center shaft can be varied at pleasure and to any needful extent.

The drawings perhaps sufficiently show how that after the pipe is centered, as described, by inserting the cones w' in its opposite ends, by moving up one or both of the head-stocks, and the drills being set in rotary motion for drilling, the feed-plate f' may be moved forward by hand-wheel k', as described, for feed, or backward for withdrawal; also, the same feeding and retracting may be accomplished by the same parts and by power from the main spindle through the gears m', t'', s'', and l', and any suitable intermediate gear, as seen in Fig. 3, or by reversing intermediates on a swing-frame, similar to one shown in my other application, divided from this, for facing the flanges of pipes.

The shaft t' is driven by gear o' and any suitable power applied thereto through gears q' r' p'. This shaft t' is splined and connected to the sleeve-journal of gear w'' by a feather. The sleeve-journal of gear w'' has its bearing attached to the gang-drill frame and traverses the ways with it, the shaft t' slipping freely through.

I claim—

1. The concentric series of drill-arbors, in combination with the movable feed and retracting plate f', constructed to carry the rear ends of the drill-arbors, gears h' i', arbor j', frames Y, and rods a', substantially as described.

2. The cone w', in combination with the annular series of rotating drill-arbors g', the head-stock Y Y Z, and plate f', whereby is secured the operation of the series upon the flange to be drilled, substantially as described.

3. The frame Y Y Z and connecting-rods a', in combination with the feed-plate f', adapted to slide on the connecting-rods, drill-arbors g', the rear ends of which are supported in said plate, and means for rotating such arbors, substantially as shown and described.

4. The hand-wheel nut k', necked into frame Y, and its sleeve-screw k^2, in combination with the drill-plate f', drill-arbors g', and gears h' i', sliding upon each other, substantially as described

5. The combination of the main arbor j', gears m' t'' s'' l', nut k', sleeve-screw k^2, plate f', drill-arbors g', and gears h' and i', substantially as described.

6. The combination of the bed X, the two head-stocks Y Z, plate f', cone w', drill-arbors g', gears h' i' n' w'', shaft t', and gear o', substantially as described.

ZEBULON ERASTUS COFFIN.

Witnesses:
D. N. B. COFFIN,
JOHN H. STEVENS.