J. ROBERTSON.

Making Sheet Lead.

No. 5,820. Patented Oct. 3. 1848.

Fig. 1

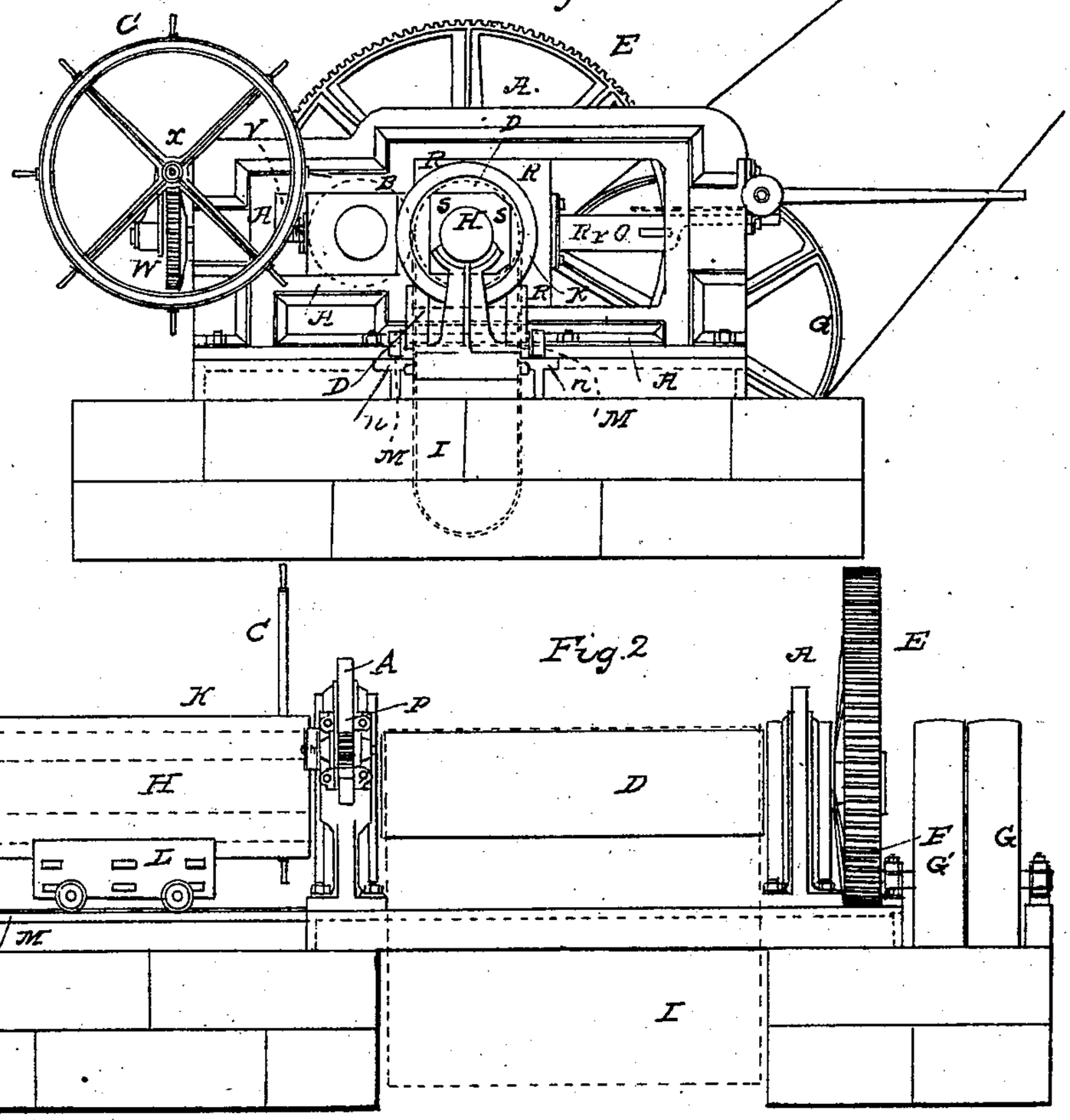


Fig. 3

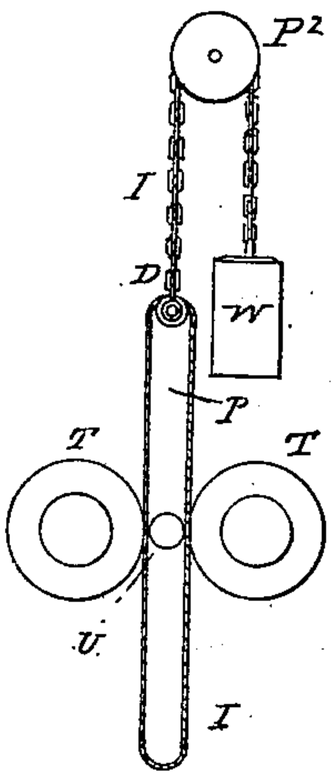
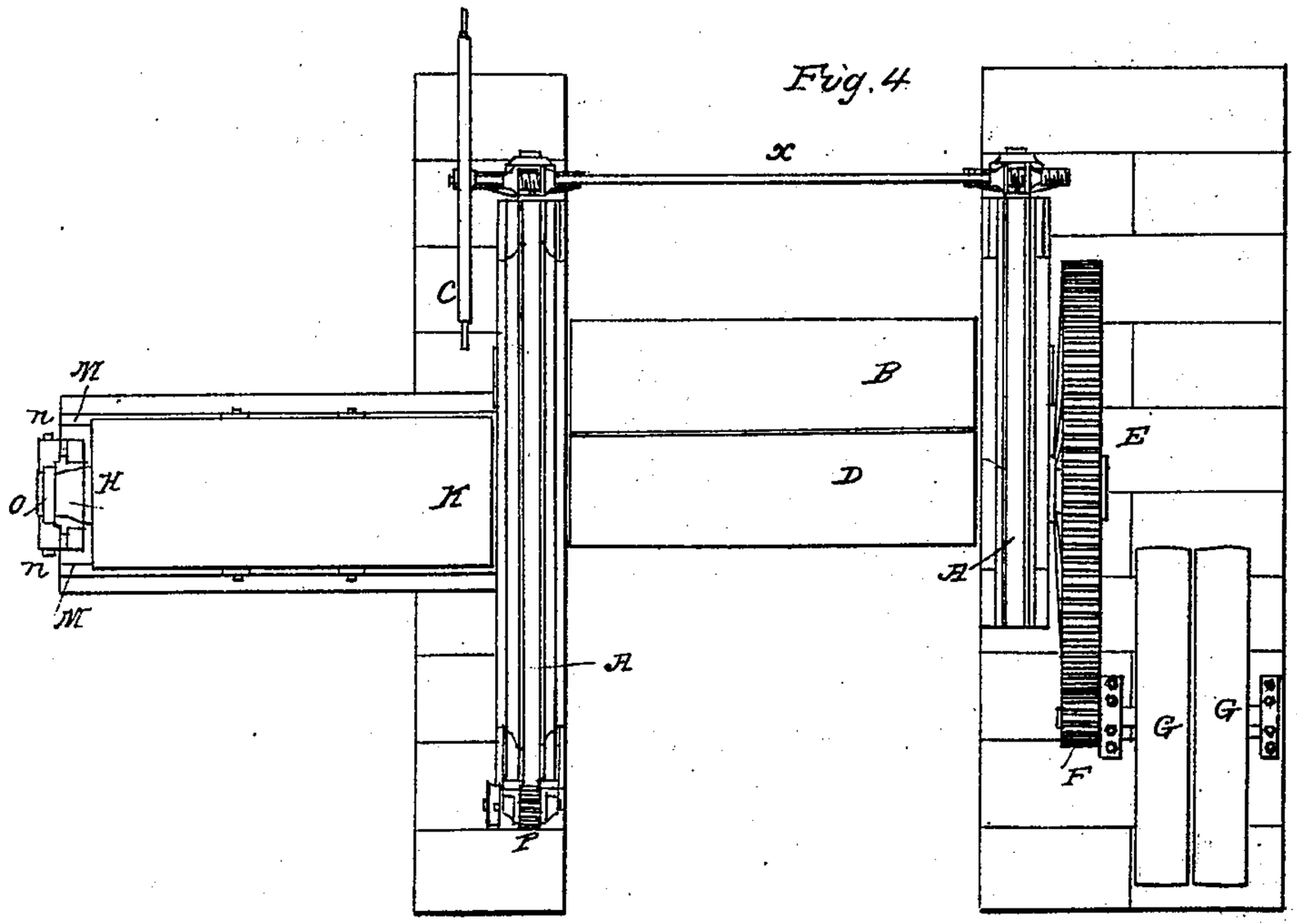


Fig. 2

Fig. 4



UNITED STATES PATENT OFFICE.

JOHN ROBERTSON, OF BROOKLYN, NEW YORK.

METHOD OF MANUFACTURING SHEET-LEAD.

Specification of Letters Patent No. 5,820, dated October 3, 1848.

To all whom it may concern:

Be it known that I, JOHN ROBERTSON, of Brooklyn, Kings county, in the State of New York, have invented a new and Improved Mode of Rolling Lead or other Soft Metal or Compound into Sheets; and I do hereby declare that the following is a full and exact description thereof in connection with the drawings annexed.

For the purpose of showing what my invention is calculated to effect, it may be as well to state the ordinary method of rolling lead as at present practiced. The lead is cast into heavy bars or sheets and run through a pair of rollers which have a reversing motion. The plate of lead is passed through these rolls, back and forward alternately, and each time it is so passed through the rollers, the machine must be reversed. And as the sheet is rolled out and becomes unwieldly from its length, it is subdivided into smaller lengths and again subjected to the action of the rollers, and so the sheet of lead is repeatedly passed back and forward till reduced to the proper thickness. By this process, much time is lost by the stopping and reversing of the machine each time that the sheet passes through the rollers and owing to the great jerking of the machinery on its being reversed, there is a great wear and tear of the machinery produced, and the time and labor taken up in cutting the lead into shorter lengths as it is rolled out and becomes unmanageable, is objectionable.

By my invention is obtained an uninterrupted rolling of an even surface; and the form of lead is neither reversed nor severed during the process of rolling and scarcely requires to be handled after at has been placed within the rollers until the process of rolling has been concluded.

Figures 1, 2, and 4, represent respectively a front and end elevation, and a plan of the machinery for rolling so far as is required to represent and explain my invention and I refer to these drawings as part of my specifications.

I put upon one (see D, Figs. 1, 2 and 4,) of a pair of rollers, an extended ring or cylindrical form of lead, which may be an inch, more or less thick. When the rollers are put in motion, (which is done by the application of any of the known means of applying—steam or water power,)—the pressing roller B, (Figs. 1 and 4) presses against the cylindrical form of lead at the part on the outside thereof opposite to the part in contact with the roller D. The form of lead is thus flattened as it is caused to revolve and brought in contact with B by the carrying roller D. As this cylinder of lead becomes thinner, its interior capacity is of course enlarged—it loses its cylindrical form, and falls or drops as represented by the dotted line D, I, K, (Fig. 1—see also D, I, Fig. 2,) becoming like an endless web or band. Each part of this form is successively pressed by the rollers as it passes opposite the pressing roller B. As the form becomes thinned or flattened, the pressing roller B is forced toward roller D, either by the workman at his discretion at each revolution, or continually, or by the adaptation of power, which, at stated intervals or continually, shall do the same. The rollers are kept in continuous motion, until the whole form has been rolled to its required thickness. When this has been accomplished, the cylindrical form (now become an endless band) is cut across, and the sheet drawn away, ready to be rolled up for use, or to be cut into smaller sized sheets if required.

I will now proceed to explain particularly the process and the machine required.

Fig. 1, delineates a front view; Fig. 2 an end elevation; Fig. 4 a plan (the same letters refer to the same parts on each figure) A, A, A, indicates the end of the frame of the machine B indicates the pressing roller. It is forced against or from D, the carrying roller, by any of the well known modes of forcing or sliding a heavy mass.

The mode adopted by me as being convenient and suitable is represented herein C (Fig. 1, Fig. 4,) is a spoke wheel (a crank may answer) attached to an axle *x*, which extends across the machine. (See Fig. 4.) On this axle *x* is a screw near each end these screws each work a screw wheel (W represents one). These wheels W turn on an axle on which is cut a screw the end of which is attached at *y*, to the bearings of the pressing roller B (only one is represented in the drawing—see Fig. 1). So that as the arm of C is turned one way or another the screw, V, forces the bearings of B back and forth. These bearings are fitted to slide in the rectangular space left in the frame of the machine A A.

In each end of the frame is a bearing to support the axles of B, and these bearings slide in the frame in the rectangular space represented in Fig. 1, as it is forced by the screw V. The carrying roller D, does not require to be moved from its position. The axle of D at the opposite end or slide to the one drawn at Fig. 1 should be placed on a permanent bearing on the frame, so that when B is pressing against D, the latter cannot be forced out of its place.

The roller D with its place of bearing and extended bar H, is more than twice as long as that of B. The object of this is,—that while the form of lead K, (Fig. 1) is being rolled, another ring or cylindrical form of lead K (Fig. 2) can be placed on H, and after the first form has been rolled and cut and taken away, the new form K, (Fig. 2) on the bar H, can be carried along on the railway M, by means of the carriage on wheels L (Fig. 2) through the frame work and slipped on the roller D to be pressed. The axle of the bar H of D rests on a hinged or movable bearing N which turns outward on the axles, *n n*.

In the frame work (see Fig. 1) at the end drawn in the figure, is a rectangular space, which permits the sliding bearing R, R, *r* to be forced back and forth by a pinion on the axle of the "arm" which works in a "rack" attached to *r*, which is a part of the bearing R R *r*.

Q represents a cut or opening into which is put a key which holds the bearing R R *r* in its place, and then the bearing of the axle of D is perfect and the machine may work. Q is taken out when the arm is to be lifted up, to draw this bearing back. The model has a screw which effects the same end.

S S S represents the permanent bearing of the roller D in the frame work. It incloses H and H revolves in it. It is shaped as drawn in Fig. 1, so as to fit into R, R, R, when that bearing is forced up. The bearing S, S, S has a circumference about equal to that of D, and the cylinder of lead must have its interior diameter or bore of sufficient capacity to slide over S S and on to D. The diameter of that part of the roller D represented by H, need not be the same as that of D (Fig. 2). H should be long enough for the form of lead to be put on. The roller D must be long enough to allow for the spreading of lead as it becomes flattened, and thick enough to avoid yielding or bending during the process of rolling, but it gets very little wider while being rolled. H, is a continuation of D.

When it is desired to prepare a form of lead for rolling, the hinged bearing N is turned down, this leaves the axle of the bar H, (Fig. 1) free, but the roller is supported by the bearing S S, R R, in the frame work, so that the roller D may be revolving. A form of lead K, which will loosely encircle the bar H is then placed thereon by means of the carriage L, which is made with a curve in its body that fits the outside of the cylinder.

The form rests on the carriage which is pushed along until the form be carried so far as to rest as shown in Fig. 2, then the hinged bearing N is raised and H again rested at O thereon. When the form of lead before put upon D, has been rolled sufficiently and cut and taken away in order to put a new cylinder K thereon, raise the "arm"—this, by the pinion working on the "rack"—attached to *r*, draws out the bearing R R—this leaves a space around the bearing S S large enough to admit the form of lead K to slip along on H through the frame work A on to D. The diameter of D and that of S S, is about that of the interior of this cylinder K. The carriage L which is supporting K all the time it is on or rather around H—is again pushed onward and carries with it K as before described. The form of lead is then pushed or drawn by a tackle so as to fit on D, and clear the frame.

The bearing R R *r* is then forced back by the "arm" and "rack" and S S is again supported by the bearing R R which is thereby slid under it and thus a firm bearing for D and H to revolve on in the frame is created. The carriage L is shorter than the cylinder, so that the end of the cylinder may be projected through the frame, as the carriage goes no farther than the frame.

The pressing roller B is then forced against the outside of K by the spoke wheel or crank C and the screw work described and the two rollers are then caused to revolve by slipping an endless band from the loose pulley G (Fig. 2) to the fast pulley G′, and the band causes G′ to turn; this turns the pinion at the end of the axle which turns the cog wheel E, which is attached at the far end of the axle of D on the outside of the frame work opposite from where H is (see Figs. 2 and 4). Thus the roller D is turned, and B being forced closely against the cylinder of lead, compresses it, while it also is turned by the friction.

It is obvious that the cylindrical mass of lead may be suspended by ~~a rope~~ or chain or bar, and swung or borne horizontally so as to be made to encircle the carrying roller. I can also use any form of lead or other metal or compound, that will encircle the roller D.

There are of course many modes by which by slight alterations of the arrangement the effects of this machine on a cylindrical form of lead may be produced. The carrying roller may also be constructed so as to be forced against the other roller or against a

fixed body as the cylindrical form of lead becomes thin, although I prefer the arrangement above described.

Fig. 5 represents a different arrangement of machinery whereby the same effects can be produced as those described.

U designates a carrying roller upon which has been placed a form of lead I I as above described encircling the roller.

T T represents two other rollers, one on each side of *u* and so arranged that they shall be forced against the outside of the form of lead and the roller *u* as it becomes flattened.

W is a weight suspended by a chain or rope over a fixed pulley P′. This chain is attached at the other end to the end of the axle bar of a movable pulley P. A like arrangement should be made at the other end of the movable pulley. The axle bar of this movable pulley is run through the opening or bore of the cylindrical form of lead, so that by having each end of the axle bar upheld; and by means of one or more weights suspended over one or more permanent pulleys; drawn upward the form of lead I, I, as it has become pressed out has been drawn upward by the weight or weights and thereby kept it from encumbering the rollers, as it became flattened and extended. It is obvious that the arrangement represented here is not the only mode by which this part of my invention can be arranged. For instance let it be supposed that the drawing (Fig. 5) had been drawn, extending longitudinally at right angles to its present longitudinal lines. Then one of the rollers T would be below instead of at the side of *u*, and the other roller T would be above the roller *u*. In such case it would perhaps be necessary that another set of weights and pulleys should be arranged so that the form of lead would be drawn out as it became flattened and extended.

Although one of the rollers T (say for instance the under one) might be dispensed with and a flat plane surface substituted in place of that roller, on which the form would slide as it was pressed and dragged along; still I prefer the use of the three rollers.

I do not claim as having invented a cylindrical form of lead or other soft metal or compound. Others have made such without doubt but no person has ever made the same and then manufactured it into sheet lead as I propose. Neither do I claim the manufacture of lead and other soft metals and compounds by rolling with smooth rollers. But

I do claim as my invention—

1. The mode of manufacturing such hollow cylindrical forms of lead and other soft metals and compounds into sheets by first placing them around a roller whose axis may be in a horizontal plane or in one of any inclination and then rolling it by any known mechanical means, until it shall be rolled to a proper thickness substantially as above described whereby handling the sheet during the process is avoided, and a continuous rotary motion in one direction may be given to the rolls.

2. I claim the construction of the carrying roller constructed substantially as described herein and the manufacture therewith of hollow cylindrical formed pieces of lead or other soft metal or compounds into sheets by rolling, combined with the movable bearings and pressing roller or rollers substantially as herein described.

3. I claim the manufacture of lead or other soft metal or compound into sheets by supporting a hollow form thereof and rolling it by one or more pressing rollers forced against the outside of the form, as it becomes thinner, and drawing out the extended form when required, in the mode substantially as described.

JOHN ROBERTSON.

In the presence of—

MILES B. ANDRUS,

CLARENCE LIVINGSTON.