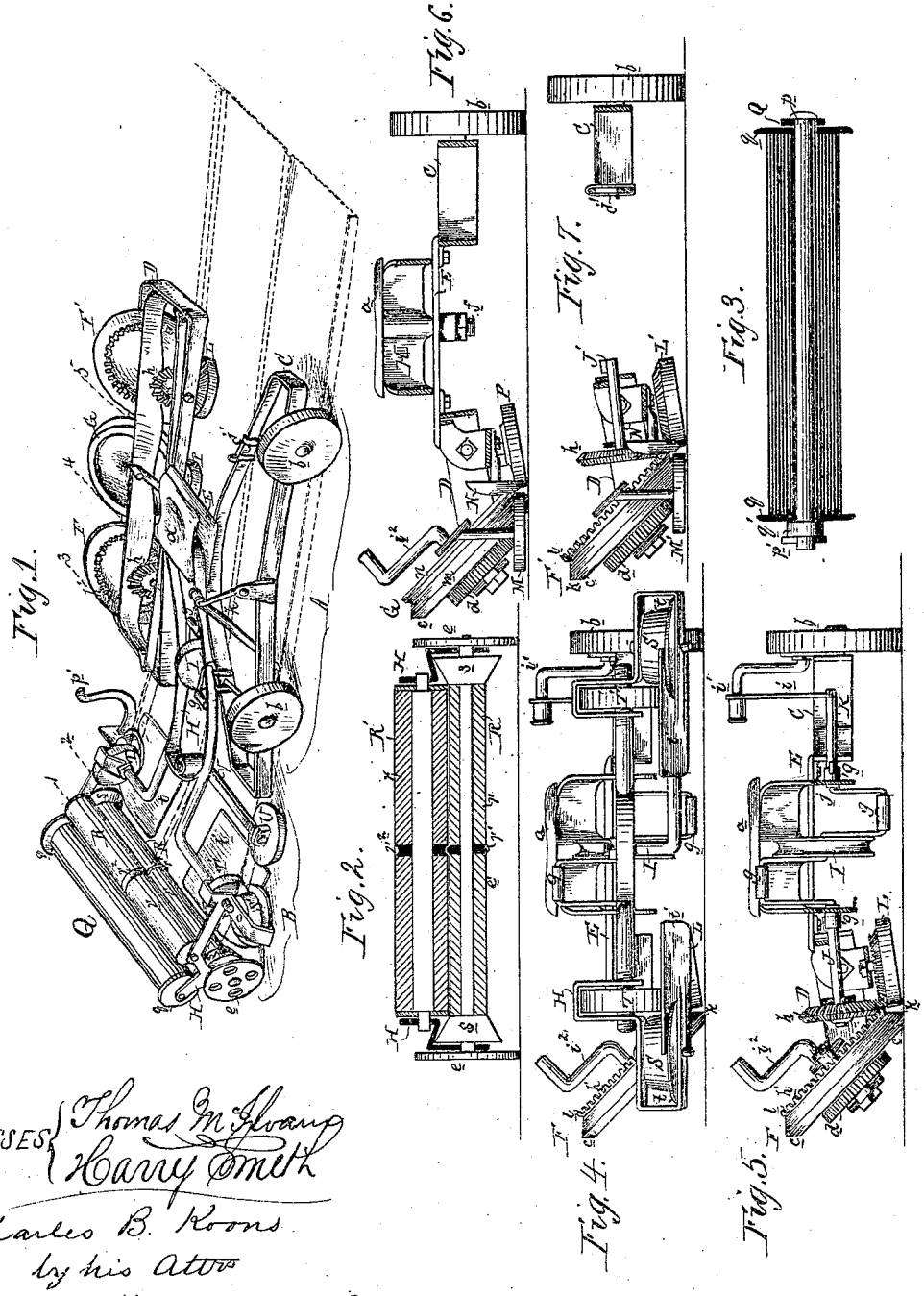
2 Sheets--Sheet 1.

CHARLES B. KOONS.

Improvement in Roofing-Machines.

No. 127,896. Patented June 11, 1872.



WITNESSES: Thomas M. Stoarp
Harry Smith

Charles B. Koons
by his Attys
Howson and Son

2 Sheets--Sheet 2.

CHARLES B. KOONS.

Improvement in Roofing-Machines.

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FIG. 8

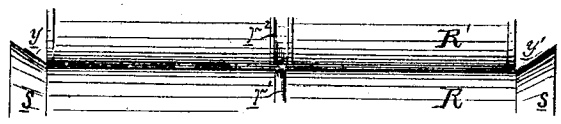


FIG. 9

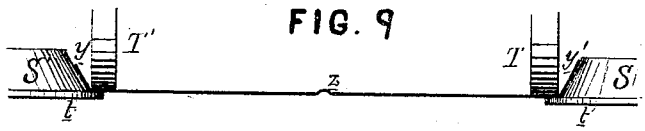


FIG. 10

FIG. 11

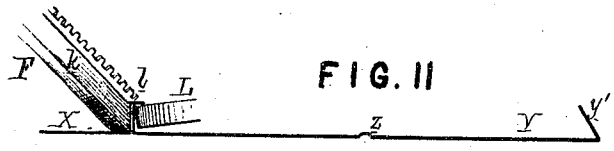


FIG. 12

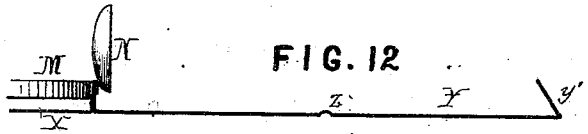


FIG. 13

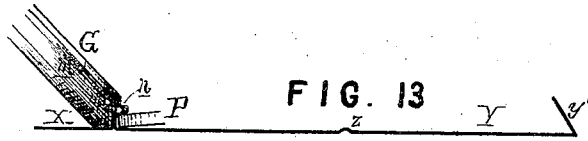


FIG. 14

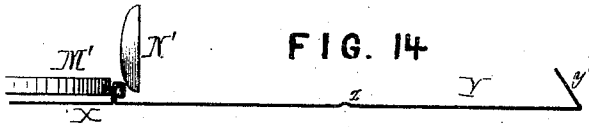
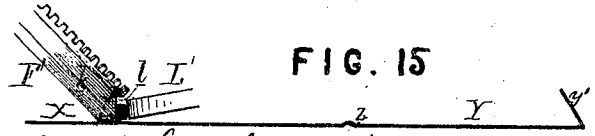


FIG. 15



Witnesses { Harry Smith
Thomas McElvain

Inventor.
Charles B. Koons
by his Attys.
Howson and Sons

UNITED STATES PATENT OFFICE.

CHARLES B. KOONS, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN ROOFING-MACHINES.

Specification forming part of Letters Patent No. 127,896, dated June 11, 1872.

Specification describing an Improved Roofing-Machine, invented by CHARLES B. KOONS, of Philadelphia, Pennsylvania.

Improved Roofing-Machine.

My invention consists of a machine, too fully explained hereafter to need preliminary description, for laying sheets or strips of sheet metal upon a roof, flattening, straightening, and creasing the said strips, turning up the edges of the same for the standing joints, and for finally completing the said joints.

In the accompanying drawing, Figure 1, Sheet 1, is a perspective view of my improved roofing-machine; Fig. 2, a transverse section on the line 1, Fig. 1; Fig. 3, a sectional view of the tin roller; Fig. 4, a transverse section on the line 2, Fig. 1; Fig. 5, a transverse section on the line 3, Fig. 1; Fig. 6, a transverse section on the line 4, Fig. 1; Fig. 7, a transverse section on the line 5, Fig. 1; and Figs. 8, 9, 10, 11, 12, 13, 14, and 15, Sheet 2, diagrams illustrating the successive operations of the machine. All of the transverse sections on Sheet 1 are drawn to a larger scale than Fig. 1, and the diagrams, Sheet 2, are drawn to a larger scale than the said transverse sections.

The machine is composed of two main parts, A and B, Fig. 1, the former of which consists of opposite side frames C and D connected together by a cross-piece, E, to which is secured a seat, *a*, for the operator, this portion of the machine being supported at one side by ordinary wheels *b b* hung to the frame C, and at the opposite side by three inclined wheels, F, F′, and G, hung to the frame D, beveled at their outer edges *c* so that they may have a firm and flat bearing upon the roof, and all geared together by cog-wheels *d* upon their spindles, and similar intermediate cog-wheels, Figs. 5, 6, and 7, so that when motion is imparted to either of the wheels F or F′ the whole of the series of three wheels shall be turned in the same direction and at the same rate of speed. The portion B of the machine has a frame, H, supported at its outer end by two wheels, *e e*, turning loosely upon a roller-shaft, *e′*, Figs. 1 and 2, and secured at its inner end by a bolt or pivot, *f*, to the cross-piece E of the frame of the portion A of the machine. Either end of the portion A of the machine may be considered the front, as it is precisely alike at both ends, and the connection with the portion B at the point *f* is such that the latter can be turned so that it shall always be in the advance when the machine is in operation, and be followed by the portion A whether the said machine be moved in one direction or the other. The driving-shaft I is immediately in advance of the seat *a*, has its bearings in the frame H of the portion B of the machine, Figs. 1 and 5, and is formed with two cranks or treadles, *g g*, in order to enable it to be turned by the feet of the operator. The driving-shaft has at its opposite ends slip-couplings *g′*, by which it is connected at one end to a shaft, J, hung to the side frame D of the machine, and furnished with a bevel-wheel, *h*, gearing into teeth *h′* on the inclined driver F, before referred to; and at the other end it is similarly connected to a crank-shaft, K, having its bearings in the side frame C of the machine, and attached by a rod, *i*, to a crank, i^1, on the side frame intended to be turned by the hand of the operator. This crank-shaft K, which forms a continuation of the driving-shaft, may, if desired, be attached to one of the supporting-wheels *b*, in order to convert the latter into a driver. The intermediate inclined driving-wheel G is provided at the inner end of its spindle with a crank, i^2, to be turned by the operator with one hand, while with the other he grasps the crank i^1, and with his feet turns the cranked driving-shaft I, the portion A of the machine being thus propelled over a roof, pushing the portion B before it. When the relative positions of the portions A and B are reversed, by turning the latter upon its bolt *f*, so as to make what was formerly the rear the front of the machine, the driving-shaft I is disconnected from the shafts J and K, and, after being turned or reversed with the portion B, is connected at one end by means of its slip-couplings *g′* to a shaft, J′, and at its opposite end to the shaft K, which, with its appliances, is also turned over and adapted to a bearing, *j′*, on the side frame C, similar to its former bearing *j* at the other end of the side frame, Figs. 1 and 7. The shaft J′ is precisely similar to the shaft J, and communicates motion in the same manner as the latter by means of a bevel-wheel, *h*, to the driver F′,

and thence to the wheels G and F. The inclined driving-wheel F is beveled on its inner edge at such an angle that the lowermost portion K of the said edge shall be vertical, or nearly so, as best observed in Figs. 5 and 11, and on the said wheel there is also formed a flange, *l*, at right angles to the said beveled edge. A wheel, L, is hung to the under portion of the side frame D, adjacent to the driver F, and is provided with bevel-teeth on its upper edge gearing into the bevel-wheel *h*, so that it shall be turned by the latter simultaneously with and in the same direction as the driving-wheel, the beveled edge *k* of the latter being parallel, or nearly so, with the edge of the said wheel L, for a purpose described hereafter. (See Figs. 5 and 11.) The driver F′ at the other end of the side frame D is also formed with a beveled edge, *k*, and flange *l*, at right angles to the same, and is combined with a wheel, L′, similar to the wheel L, and operated in the same manner by the bevel-pinion, *h*, before referred to, on the shaft J′. (See Figs. 1, 7, and 15.) The intermediate driver G has a beveled edge, *m*, the lowermost portion of which is always vertical, and a flange, *r*, at right angles to the same, and the said driver is combined with a plain wheel, P, hung to the side frame D at such an inclination that its edge and upper surface shall fit into the angle formed by the beveled edge *m* and flange *n* of the driver. (See Figs. 6 and 13.) At a point about midway between the drivers F and G there are two wheels, M and N, both hung loosely to the side frame D at right angles to each other, and in such relation that a narrow space shall intervene between the vertical edge of the wheel M and the rounded face of the wheel N. (See Figs. 6 and 12.) There are also precisely similar wheels M′ and N′ between the drivers G and F. (See Figs. 7 and 14.) At the outer end of the portion B of the machine is a transverse rod, *p*, supported at one end by the frame H, and at its opposite end by a hooked lever, *p′*, adapted to a hole in the said rod, thus holding the latter in position, and enabling it, after detaching the said lever, to be withdrawn from the frame. (See Figs. 1 and 3.) A flanged roller, Q, (carrying the rolled strip of sheet metal, which is to be laid upon the roof, edged up, and joined to other similar strips,) is adapted to and arranged to turn loosely upon the rod *p*. One of the flanges *q* of this roller is made detachable, in order to enable the rolled strip of sheet metal to be slipped onto the same from one end; and the said roller can also be adjusted toward one side of the machine or the other upon its rod *p*, and be retained after adjustment by means of washers *q′* adapted to the said rod. (See Fig. 3.) The object in thus adjusting the roller is to enable more of one edge of the roll of tin than the other to be subjected to the creasing and edging devices, as will be hereafter explained. Adjacent to the tin roller Q, but at a lower level than the same, are two parallel rollers, R and R′, one directly beneath the other, and both covered with rubber or other equivalent yielding material *r*. (See Figs. 1 and 2.) The roller R is hung to the transverse shaft *t t′*, before referred to, but turns in a direction opposite to that of the wheels *e e*, and the roller R′ is hung to a shaft having its bearings in the opposite sides of the frame H. In the center of the roller R there is a steel disk, r^1, having a rounded edge adapted to a corresponding concavity in the edge of a disk, r^2, secured to the roller R′, the object of which will be explained hereafter, and at each of the opposite ends of the roller R there is a conical bending-wheel, *s*. (See Figs. 1, 2, and 8.) At one side of the frame H, adjacent to the rollers R and R′, but at a somewhat lower level, is a conical wheel, S, slightly inclined from the horizontal, and having at its lower edge a flange, *t*, and into the angle formed by the latter and the conical edge of the wheel extends a plain wheel, T, hung loosely to the frame H. At the opposite side of the machine there is a precisely-similar conical flanged wheel, S′, and plain wheel, T′, and on line with the flanges of the said wheels S and S′ are narrower ledges or platforms *t′*, secured to the frame for the support of the sheet metal, to be operated upon as hereafter described. (See Figs. 1, 3 and 9.) At a point between the wheels S and T and the portion A of the machine is a conical wheel, U, narrower at its lower than at its upper edge, and hung to a rod, V, pivoted to the frame H, so that when the latter is reversed, as before mentioned, the said wheel U can be turned around in order to occupy the same position in respect to the wheels S′ and T′ that it formerly occupied in respect to the wheels S and T. (See Figs. 1 and 10.)

The operation of roofing, as ordinarily conducted, is as follows: A number of sheets of tin are soldered together so as to form strips of the required length, which strips, in the form of rolls, are conveyed onto the roof, and there unrolled and placed side by side. The opposite edges of each strip are then, by means of tongs constructed especially for the purpose, bent upward at right angles to a height varying from three-fourths of an inch to one and one-half inch; but the turned-up edge at one side must be lower than that at the other. This having been accomplished, the several strips are properly adjusted and secured to the roof so that the high turned-up edge of one shall be adjacent to or in contact with the low turned-up edge of the next, after which, by means of mallets, or by clamping and bending machines, the edge of one strip is bent over that of the next so as to form what is termed a single standing-joint or seam; or, by bending the said edges one around the other by a double turn, a double seam may be formed.

By the use of my machine these several independent operations are made continuous from the unrolling of the tin to the forming of the single or double seam. The roll of tin is placed

upon the roller Q and drawn through the machine, and is secured at its outer end to the roof, so that, as the machine is moved forward by the operator seated thereon, the tin shall be unrolled and laid upon the roof. In order that the operation of the machine may be fully understood we will suppose that one strip, X, Fig. 10, has already been laid upon the roof, and its edge *x* bent upward and inward, as shown, and that another strip, Y, is being paid out by the machine, to be laid alongside of and secured to the strip X by a double seam. The tin, after passing from the roller Q, is first passed between the rollers R and R′ and over the inclined or bevel-wheels *s s* at the opposite ends of the roller R. The gum-covered rollers will straighten and remove all inequalities and wrinkles from the tin, and will, at the same time, press the latter onto the bevel-wheels *s s*, by which its opposite edges *y* and *y′* will be slightly turned up, as shown in Fig. 8. A central rib, *z*, will also be formed on the strip of tin by the disks r^1 and r^2, which rib will strengthen the strip and render it less liable than usual to be flapped and lifted from the roof by the wind. It will be observed that the turned-up edge *y* of the strip is narrower than the opposite edge *y′* and than the edge *x* of the adjacent strip, with which it is to be joined. This is essential, and is accomplished by setting the roller Q a little to one side upon its rod *p* in the manner before described. (See Figs. 3, 8, and 10.) From the rollers R and R′ the tin passes over the supporting-platforms *t′*, and thence between the two sets of bending-wheels S T and S′ T′, Fig. 9. The wheels T and T′ press the tin down upon the flanges *t* of the wheels S and S′, and thus, by forcing the bent edges *y* and *y′* against the beveled sides of the said wheels, turn the said edges up to a still greater extent. (See Fig. 9.) The edge *y′* of the tin is next, in passing the beveled edge of the wheel U, bent inward by the same until parallel, or nearly so, with the opposite edge *y*, which is now in contact with the higher or wider edge *x* of the adjacent strip, with which it is to be joined. (See Fig. 10.) This completes the operation with the edge *y′* until the next strip is laid; and the edges *x* and *y* are joined by the device attached to the portion A of the machine when the latter passes over them, as I will now proceed to describe.

In passing between the wheels F and L, Fig. 11, the inclined edges *x* and *y* will be turned upward to a vertical position, and, by the action of the flanges *l* of the wheel F, the extreme upper portion of the edge *x* will be turned over the edge *y* at right angles to the latter. This turned-over portion of the edge *x* will next be flattened in against the edge *y* by the action of the curved face of the wheel N in passing between the latter and the wheel M, which will complete the single seam. (See Fig. 12.) Nearly the same operation is repeated to form the double seam, the upper portion of the joined flanges being first turned over at right angles by passing between the wheels G and P, Fig. 13, then turned in by the action of the wheels M′ and N′, Fig. 14, and finally pressed flat by the last pair of wheels F′ and L′, Fig. 15. When the whole of the strip of tin has been thus paid out and joined to the one already laid, another roll is placed upon the roller Q, and the machine is then run back and lifted to one side so as to lay this third strip by another forward movement in the same direction. I prefer, however, where the strips are of great length, to reverse the portion B of the machine upon the portion A, as before described, after the laying of a strip, so as to make what was formerly the front the rear of the machine, and thus lay the next strip on the return movement of the machine. To accomplish this it is necessary, after the reversing of the portion B, to connect the driving-shaft I with the shafts J′ and K to turn the wheel U and to shift the tin rollers Q so as to bring the narrow edge of the tin to the proper side.

If desired, the operator may push the machine before him over the roof instead of sitting upon and propelling it in the manner of a velocipede. In such case the seat and cranked driving-shaft and hand-cranks could be dispensed with.

I claim as my invention—

1. A roofing-machine the operating parts of which are attached to two main frames, A and B, connected together and capable of being turned one upon the other, substantially as and for the purpose described.

2. The combination, with a roofing-machine, of a cranked driving-shaft for being operated by the feet, the supplemental hand-cranks, and the driving-wheels, whereby the said machine may be propelled over a roof, as set forth.

3. The roller Q hung to a rod, *p*, on the frame H, and otherwise constructed and arranged, substantially as herein described, for the ready attachment and retention of a rolled strip of sheet metal.

4. The said roller Q, rendered adjustable upon the rod *p* by washers *q′* or their equivalents, Fig. 3, for the purpose specified.

5. The combination, substantially as described, of the elastic rollers R and R′ and disks r^1 and r^2 attached to or forming part of the said rollers.

6. The combination of the rollers Q and rollers R and R′ with the beveled bending-wheels *s s*, and with the other bending-wheels arranged on a machine for traversing a roof.

7. The combination, substantially as described, of the bending-wheels S and T and S′ T′.

8. The combination of the roller Q, straightening-rollers R and R′, beveled wheels *s s*, flanged and beveled wheels S and S′, plain wheels T and T′, and the beveled wheel U.

9. The wheel U hung to a pivoted rod, V, and capable of being turned with the latter to one side of the machine or the other.

10. The inclined beveled-edged wheel F and horizontal or nearly-horizontal wheel L, con-

structed and operating together substantially as described.

11. The combination, with the said wheels F and L, of the horizontal wheel M and vertical wheel N.

12. The combination of the above-mentioned wheels and beveled wheel G and inclined wheel P.

13. The combination, substantially as described, with the three wheels F, F′, and G, and their appliances, all geared together and operating simultaneously, of the two sets of wheels M N and M′ N′.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

CHAS. B. KOONS.

Witnesses:
WM. A. STEEL,
HARRY SMITH.