(No Model.) 2 Sheets—Sheet 1.

C. SCHLICKEŸSEN.

ROOFING TILE AND APPARATUS FOR THE MANUFACTURE THEREOF.

No. 309,568. Patented Dec. 23, 1884.

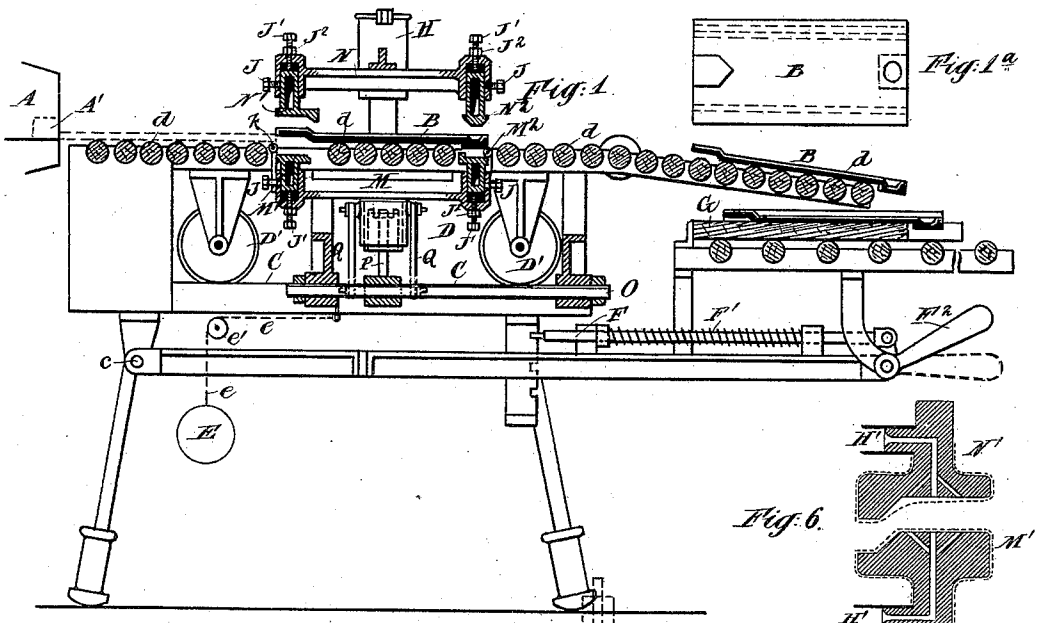


Fig. 1.

Fig. 1a.

Fig. 6.

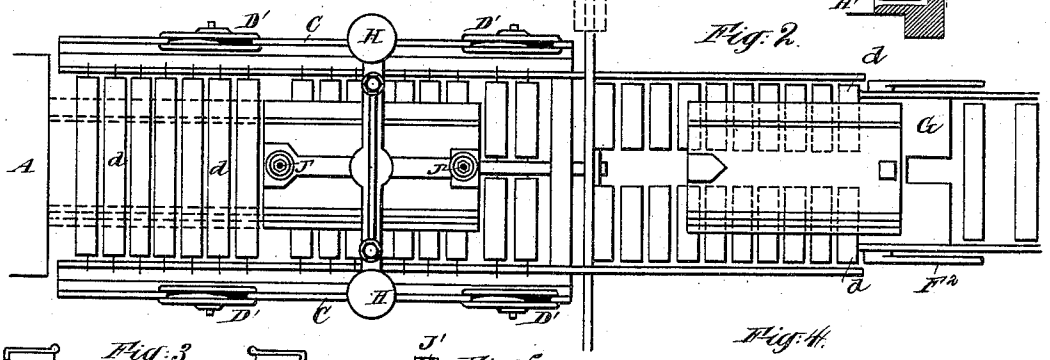


Fig. 2.

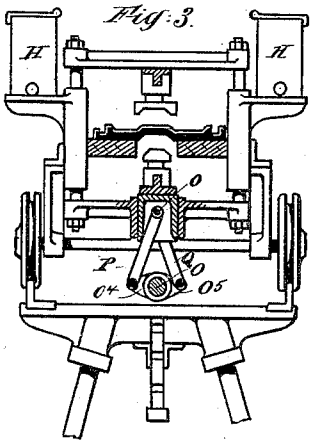


Fig. 3.

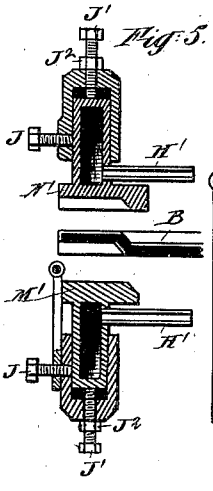


Fig. 5.

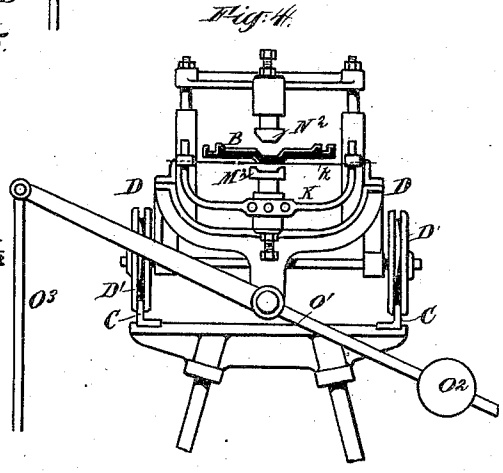


Fig. 4.

Witnesses:
W. C. Dey
M. F. Boyle

Inventor:
Carl Schlickeysen
by his attorney
Thomas D. Stetson

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

(No Model.) 2 Sheets—Sheet 2.

C. SCHLICKEYSEN.

ROOFING TILE AND APPARATUS FOR THE MANUFACTURE THEREOF.

No. 309,568. Patented Dec. 23, 1884.

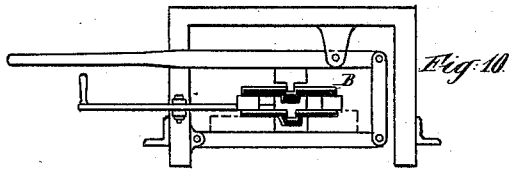


Fig. 10.

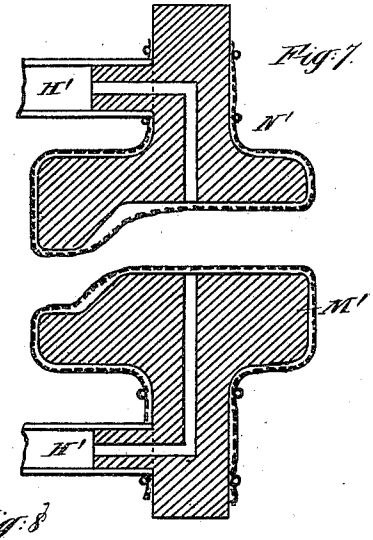


Fig. 7.

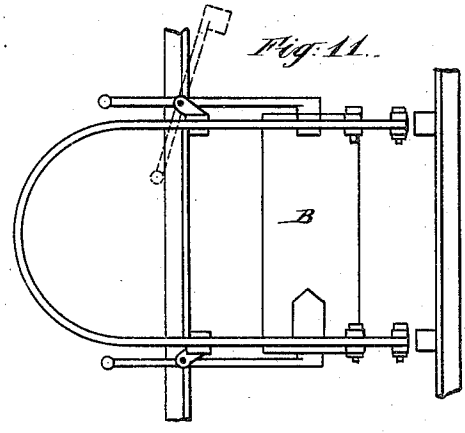


Fig. 11.

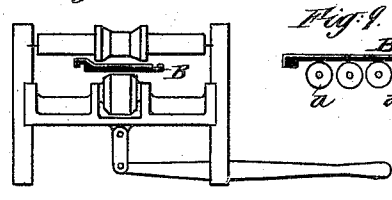


Fig. 8.

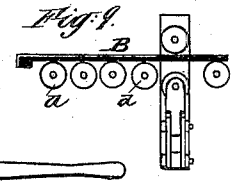


Fig. 9.

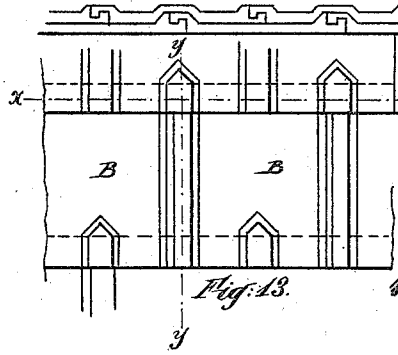


Fig. 14.
Fig. 13.

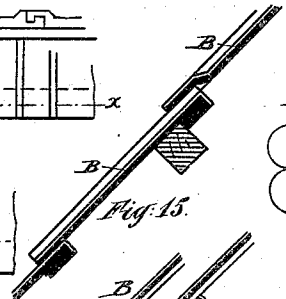


Fig. 15.

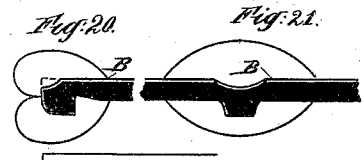


Fig. 20.
Fig. 21.

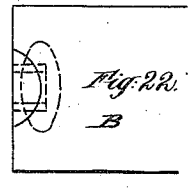


Fig. 22.

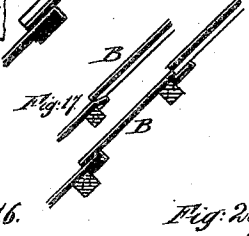


Fig. 17.

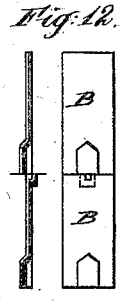


Fig. 12.

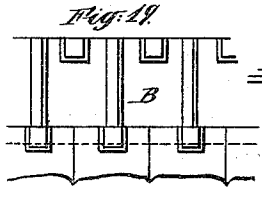


Fig. 19.

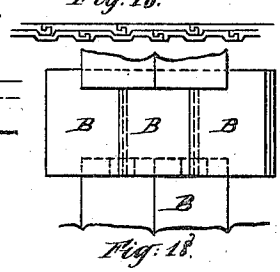


Fig. 16.
Fig. 18.

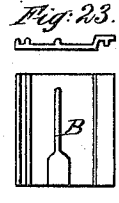


Fig. 23.

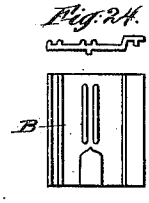


Fig. 24.

Witnesses:
M. F. Boyle
W. C. Dey

Inventor:
Carl Schlickeysen
by his attorney
Thomas L. Watson

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

UNITED STATES PATENT OFFICE.

CARL SCHLICKEÝSEN, OF BERLIN, GERMANY.

ROOFING-TILE AND APPARATUS FOR THE MANUFACTURE THEREOF.

SPECIFICATION forming part of Letters Patent No. 309,568, dated December 23, 1884.

Application filed July 9, 1884. (No model.) Patented in England February 18, 1884, No. 3,521; in France February 19, 1884, No. 160,407; in Belgium February 25, 1884, No. 64,264, and in Italy June 30, 1884.

To all whom it may concern:

Be it known that I, CARL SCHLICKEÝSEN, of Berlin, Prussia, in the Empire of Germany, have invented certain new and useful Improvements in the Manufacture of Roofing-Tiles, of which the following is a specification.

The improved tiles are shaped from properly kneaded or tempered clay by being forced by adequate pressure from a hopper or reservoir through an aperture of the proper form.

The sheet is thicker near each edge than along the main body, the increased thickness being produced preferably by folding over the clay by any suitable machinery (not shown) and pressing the folded portion into intimate contact with the other part. The thickened edges afford material for grooving the tiles longitudinally near each edge, thus locking each tile to its neighbor alongside without risk of leakage in any weather. The sheets thus shaped are forced out horizontally, and are received on a series of rollers supported in a reciprocating carriage, and subjected to further compression from peculiarly-operated dies acting on the upper and lower faces, as will be presently described. The sheets are cut off in proper lengths by cross-wires. The series of rollers and dies are mounted on a carriage which is arranged to traverse easily on wheels guided on a suitable railway below. The inclination of this railway, and consequently of the carriage, may be varied at will. After the operation of cutting off and properly shaping a tile is completed, the carriage is moved toward the source from which the sheet of clay is received. It thus moves to an extent a little greater than the length of a tile, so that when the first wire is operated to cut off a tile a corresponding wire properly situated and worked by the same motion trims also the other end of the tile, cutting off a strip more or less wide from the other end, which is waste, and leaving the tile exactly the proper length and form. In working very adhesive clay I cover the dies with linen or other thin fabric through which water may slowly percolate, and supply water at a moderate pressure to the interior of the die, so that it shall constantly wet the fabric. This insures an easy separation. The tiles, on being discharged, are received on boards, which may be piled up and exposed to a circulation of air to dry slowly. I form the several tiles with longitudinal ribs and grooves to facilitate the engagement of the tiles together.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a longitudinal vertical section through the machine. Fig. 1ª is a plan view of one of the tiles. Fig. 2 is a plan view corresponding to Fig. 1. Fig. 3 is an end view partly in section. Fig. 4 is an end view with certain portions removed. Fig. 5 is a vertical section through certain portions on a larger scale. Fig. 6 is a section through portions on a still larger scale. The remaining figures represent modifications. Fig. 7 is a vertical section. Fig. 8 is an end elevation, and Fig. 9 a corresponding longitudinal section. Fig. 10 is an elevation, and Fig. 11 a corresponding plan. Fig. 12 gives two views of tiles matched together, a longitudinal section and a plan view. Fig. 13 is a plan, and Fig. 14 a cross-section, on the line *x x* in Fig. 13. Fig. 15 is a section on the line *y y* in Fig. 13. Fig. 16 is a cross-section showing my roofing-tiles matched together and inverted. Fig. 17 is a corresponding longitudinal section. Fig. 18 is a corresponding plan view. Fig. 19 is a plan view. Figs. 20 and 21 are transverse sections of modifications of certain parts. Fig. 22 is a corresponding plan view. Fig. 23 is duplex. It shows a cross-section and a plan view. Fig. 24 is correspondingly duplex. It shows a cross-section and a plan view.

Similar letters of reference indicate corresponding parts in all the figures where they occur.

A is a reservoir containing the delivering-die A′, through which the sheet of plastic clay (marked B) is delivered by any suitable pressure. (Not shown.) A series of rollers, *d*, are mounted on a reciprocating carriage, D, supported on wheels D′ traversing on a railway, C, which is mounted either horizontally or slightly inclined. A weight, E, acting on a cord, *e*, which runs over a pulley, *e′*, turning on a fixed center, is attached to the carriage D, and constantly urges the carriage with gentle force toward the die A′. Wide spaces are

left at certain points in the series of rollers *d*, through which dies may come up from below, meeting dies coming down from above and impressing the plastic sheet of clay into the required shapes. I term as a "nose" a projection on the upper face of one end of the tile adapted to engage in a cavity, which I term a "mouth," in the end of the next tile above. Fig. 1ª shows a tile having a nose as well as a mouth in the middle of the width. These tiles lie in straight series. Other forms may lie in joggled series, or an arrangement which causes them to break joints one with another. When the tiles lie joggled or breaking joints, the mouth serves an important function in receiving the thickened portions at the edges or line of junction of the tiles in the series below. It will be obvious that in order to produce the projection for the nose and the cavity for the mouth an approximately corresponding change of form of the opposite face of the tile is necessary.

M′ is the die which, coming up from below, forms the hollow which I term the "mouth." N′ is a die which, coming down from above, shapes the opposite face of that part, allowing the clay to rise. M^2 is a die which, coming up from below, shapes the projection which I term the "nose." N^2 is a die which, coming down from above, shapes the opposite face, depressing the clay into the die M^2. The two upper dies, N′ and N^2, are mounted on a carrier, N, which is guided by the framing of the carriage D, so as to be capable of only rising and sinking therein, while partaking necessarily of its traversing motion. The two lower dies, M′ and M^2, are mounted in a carrier, M, which rises and sinks, being guided in the interior of the carrier N.

The operation of both carriers M and N is induced simultaneously by a single rocking shaft, O, which is turned by a lever, O′, one end of which carries a weight, O^2. This shaft O has an arm, O^4, on one side connected by a link, P, to the lower carrier, M. On the other side of the shaft O are two arms, O^5 O^5, connected by two links, Q, to the upper carrier, N. When the shaft O is released, the gravity of the weight O^2 throws it into such position that the lower carrier, M, is lowered and the upper carrier, N, is raised. In this condition the dies M′ M^2 N′ N^2 are of no effect. After the carriage D has moved forward and allowed a fresh quantity of thinly-molded clay to move out between the dies, and all is ready for operation, the attendant turns the lever O′, and rocking the shaft O raises the lower carrier, M, and depresses the upper carrier, N, so as to properly produce the nose and mouth. This movement may be made either suddenly or slowly. It will be understood that the carriage D, on which the clay and all the parts are supported, is moving slowly away from the reservoir A with the movement of the clay. The attendant may aid the motion of the carriage forward and backward. The railway C, on which the carriage D runs, may be inclined. The end nearest the reservoir A turns on a pivot, *c*. The other end is supported by a bolt, F, engaging in a notch in a downward extension from the track. The bolt F is subject to the force of a spring, F′. The inclination may be changed at any time by turning the bell-crank lever F^2 and withdrawing the bolt, then raising or lowering the corresponding end of the track and allowing the bolt to engage in a different notch.

To facilitate the removal of the completely-formed tile, the rollers *d* farthest from the reservoir A are arranged on a gentle incline. The completed tile moves outward with increased facility in consequence, and may be received on any suitable boards, G, provided each with a liberal notch to receive the nose. These boards may be piled up in any required quantities, with provision for a free circulation of air, until the tiles are well dried and ready for the kiln.

H H are small tanks to which water is supplied at intervals. The water flows therefrom under a gentle pressure through a flexible hose, H′, and enters the interior of each of the dies M′ M^2 N′ N^2. Each die is covered with a thin linen or muslin fabric, *i*, (see Fig. 6,) which is sufficiently pervious to allow the water to maintain it in a wet condition, so that the clay will not adhere. The presence of the wet fabric does not materially affect the action of the dies, except to aid in avoiding the adhesion of the clay. Each die is adjustable in its carrier, being held by a pinching-screw, J, and adjusted downward or upward, as the case may be, by a set-screw, J′, held firmly by a jam-nut, J^2. The lower carrier, M, in addition to the two dies M′ and M^2, carries two light yokes or bows, K K, across each of which is tightly drawn a wire, *k*. At each operation of the lever O′ and closing of the dies the wire *k* nearest the reservoir A performs the important function of separating the quantity which is to form a tile from the remaining portion of the clay. The other wire *k*—that farthest from the reservoir A—performs a less essential but not unimportant function. It cuts off a little surplus and reduces the tile to an exact length. It is difficult to control the motion of the carriage so as to get exactly the proper length by the motion of the carriage alone. I allow the carriage to move a little too far, and thus take a little too much clay at each movement, the excess being cut off by the second wire and allowed to fall idly.

O^3 is a link connected to the operating end of the lever O′. The lever may be turned by this link, if preferred.

Modifications may be made in the forms and proportions within wide limits without departing from the principle or sacrificing the advantages of the invention. I have shown various modifications.

By varying the forms and proportions of the delivering-die in the reservoir A, I can produce tiles of different widths and different thicknesses, also tiles having various grooves and

ridges in or near their margins or at other points in their lengths.

The dies M′ M² N′ N² may be varied in size and style within wide limits. I can add other dies or devices to the upper carrier adapted to print the name of the maker or any desired trade-mark or ornamental devices on the upper surface of each tile.

The manufacture of roofing-tiles and analogous extended clay devices is greatly facilitated by the use of my machine. It avoids entirely a second handling of the tiles.

Elaborately-shaped tiles may be produced with facility. Plane tiles may be made cheaper.

In Fig. 7 only a single water-passage is provided for the water to wet the thin fabric covering each die.

Figs. 8 and 9 show rollers arranged to produce any desired longitudinal ridges and bevels on the several tiles.

Figs. 10 and 11 show provisions for producing the mouth and the nose by laterally-moving levers.

This apparatus can only be used after the tiles are removed from the machine.

Fig. 12 shows the mode of applying such tiles together. They are not placed joggled, or what is sometimes known as "breaking joints," but are arranged in continuous uniform series up and down the roof.

Figs. 13 and 14 show the tiles applied together on a roof.

The longitudinal ribs shown in Fig. 13 may be varied in height and width. The clay thus added serves usefully in supplying the increased material required for the slab at those portions. In all cases the indenting or forming a hollow on one side of the slab contributes to force out material to form the projection on the other side.

I claim as my invention—

1. In a tile-machine substantially as described, the combination, with a clay-delivering die and a carriage, of one or more pairs of pressing-molds, and means for operating them simultaneously to impress upon the plastic charge a nose or mouth, or both, as set forth.

2. In combination with a die and a carrier, as set forth, two corresponding dies, as M and N, and means for moving them simultaneously in opposite directions to impress forms upon the plastic charge while it is upon the carrier, as set forth.

3. In combination with the die, the carrier having apertures through which the dies pass to operate upon the plastic charge, and the dies N′ M′ N² M², arranged above and below the carrier, and means, substantially as described, for moving said dies simultaneously in the direction of the carrier when the apertures are in correct position, as set forth.

4. In combination with the dies M′ N′, &c., having water-channels leading from suitable coupling-bosses to their die-faces, water-tanks, as H, and flexible pipe-connections from such tanks to the said coupling-bosses, as set forth.

5. In combination with the carrier D, as described, and with the die-carriers M N, and means for moving them simultaneously in opposite directions, the yokes K and wires *k*, carried on the part M, and adapted to finish both ends of the tile, as set forth.

6. In a machine for producing roofing-tiles and analogous tiles, the pressing-dies M′ N′, mounted in carriers M N, with means for operating the latter, in combination with means, J J′ J², for independently adjusting the heights of the dies, as herein specified.

7. In a machine for producing roofing-tiles and analogous tiles, the clay-delivering die A′, the railway C, carriage D, wheels D′, pressing-dies M′ N′ M² N², with means for operating them, and carrying-rollers *d*, combined and arranged for joint operation, as herein specified.

In testimony whereof I have hereunto set my hand, at Berlin, this 2d day of April, 1884, in the presence of two subscribing witnesses.

CARL SCHLICKEŸSEN.

Witnesses:
B. ROI,
JOHN R. ROSLYN.