(No Model.)

3 Sheets—Sheet 1.

J. G. STADLER.

BRICK AND TILE MACHINE.

No. 299,591. Patented June 3, 1884.

Fig. I.

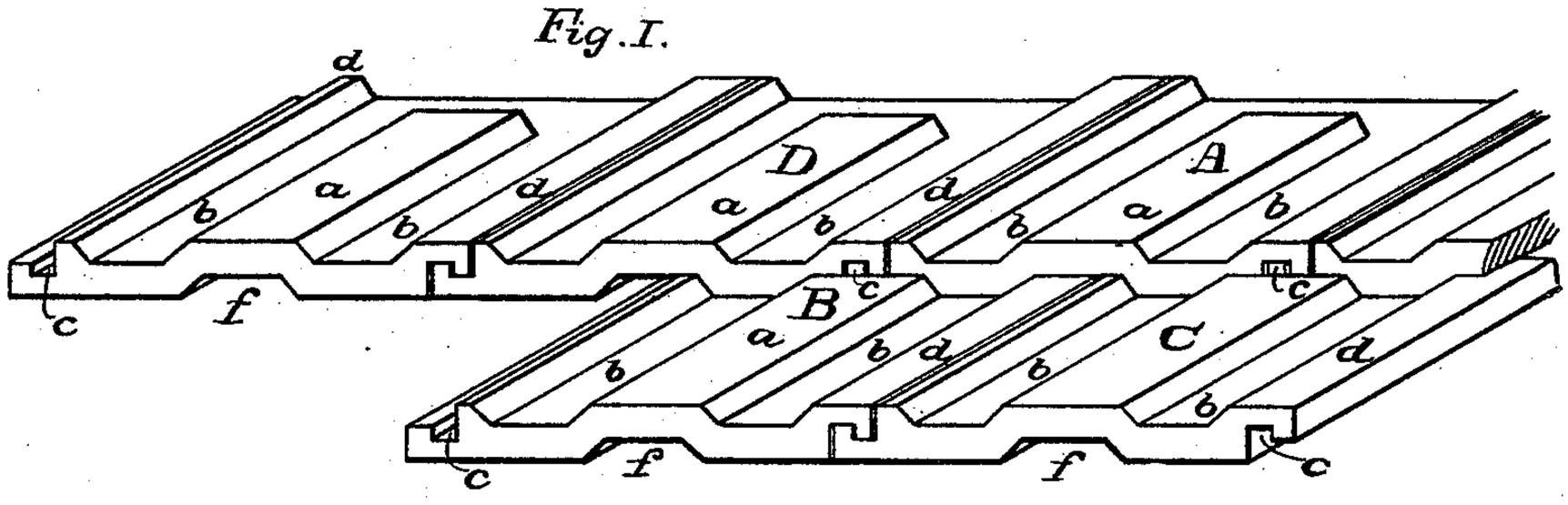


Fig. II.

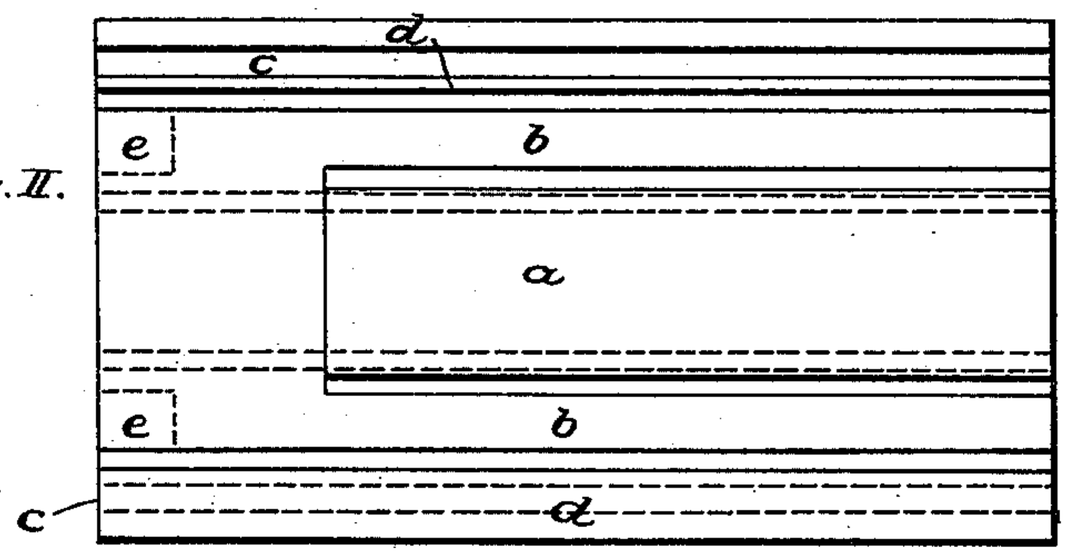


Fig. III.

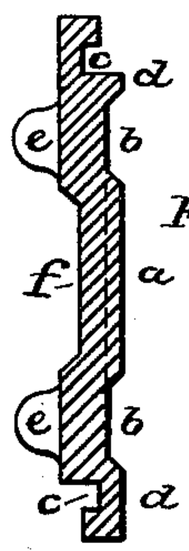


Fig. IV.

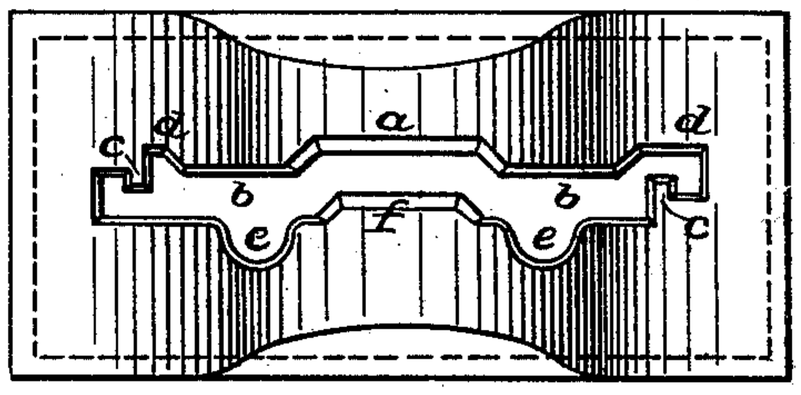


Fig. V.

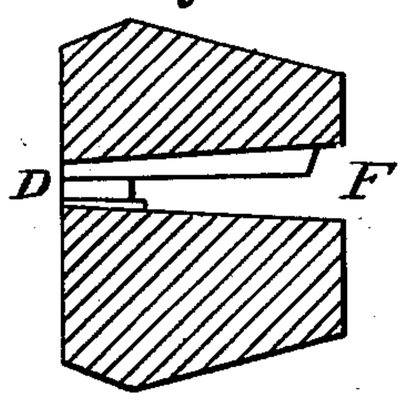


Fig. VI.

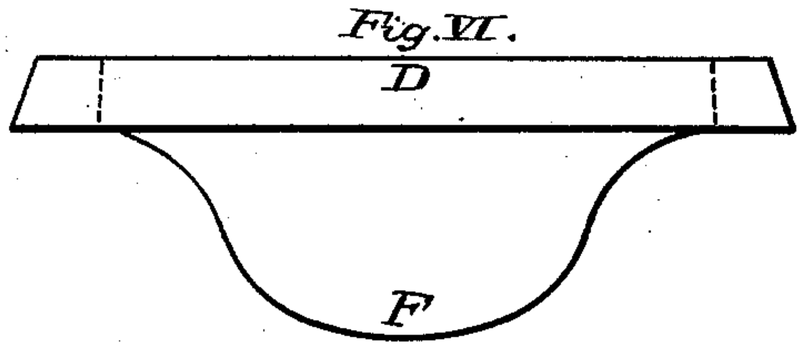
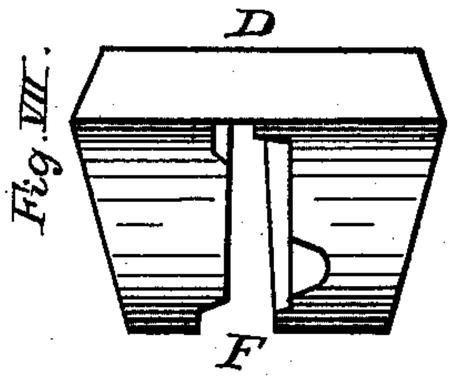


Fig. VII.



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BRICK AND TILE MACHINE.

No. 299,591. Patented June 3, 1884.

Fig. VIII.

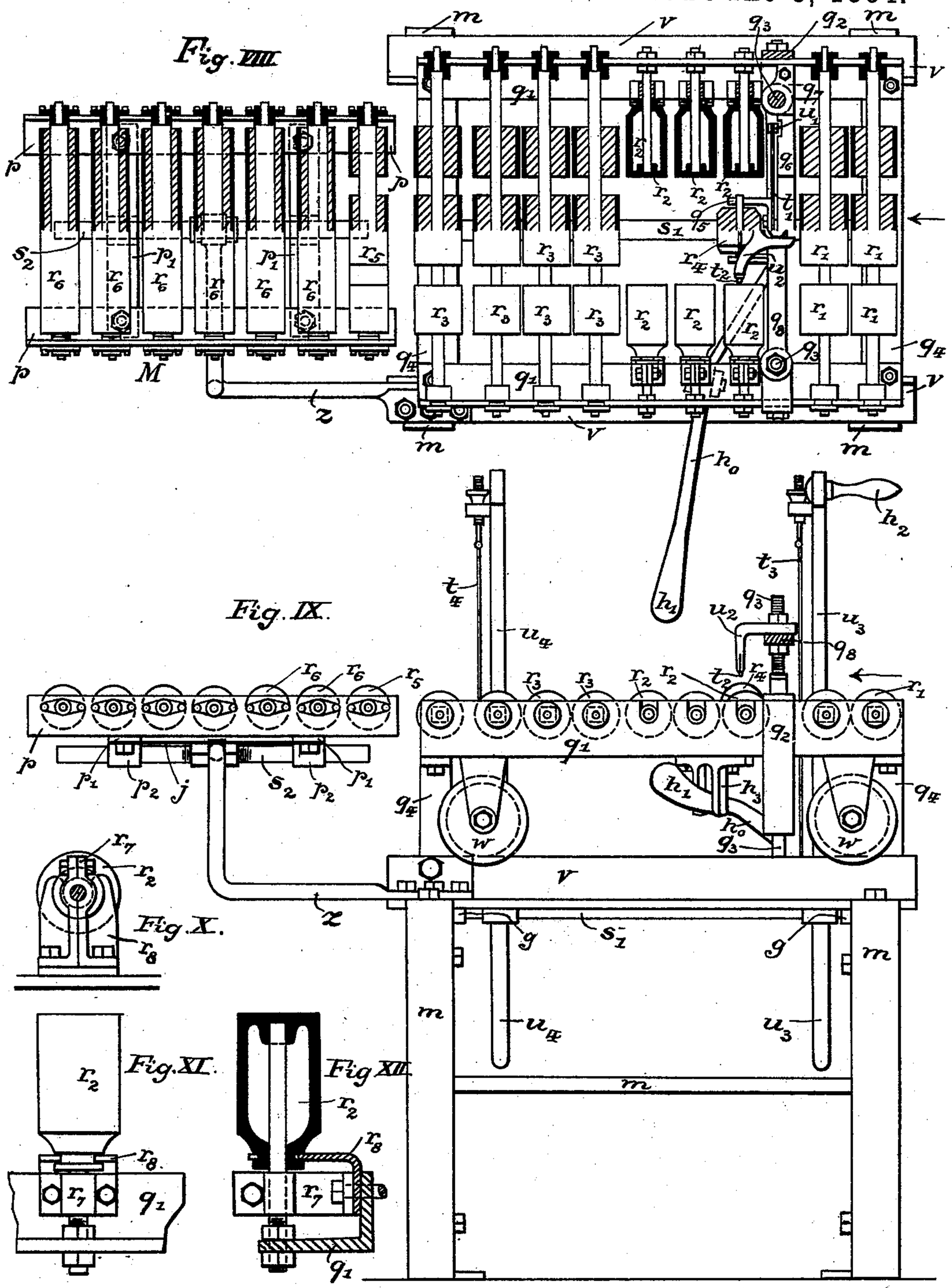

Fig. IX.

Fig. X.

Fig. XI.

Fig. XII.

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BRICK AND TILE MACHINE.

No. 299,591. Patented June 3, 1884.

Fig. XIII

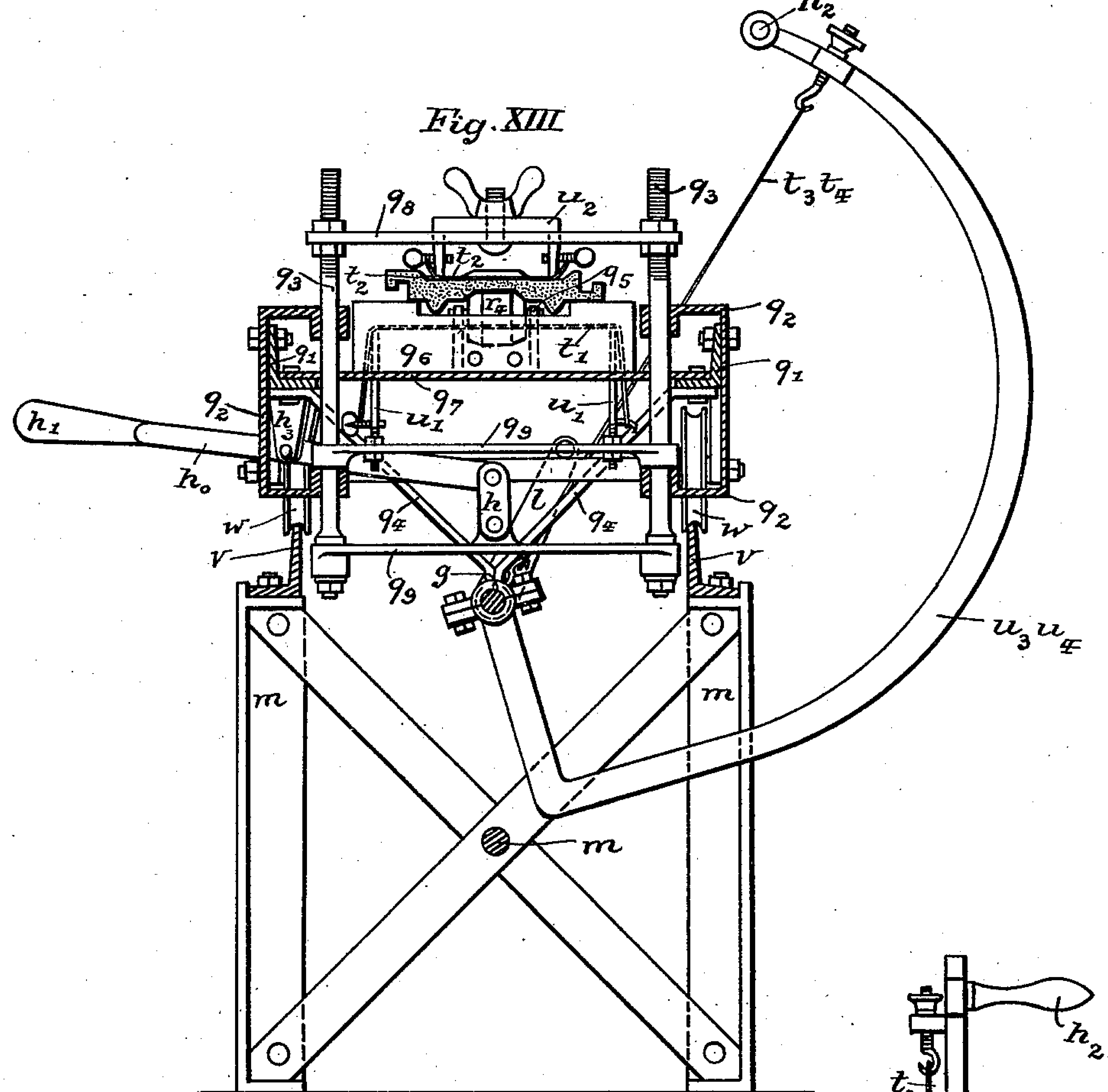
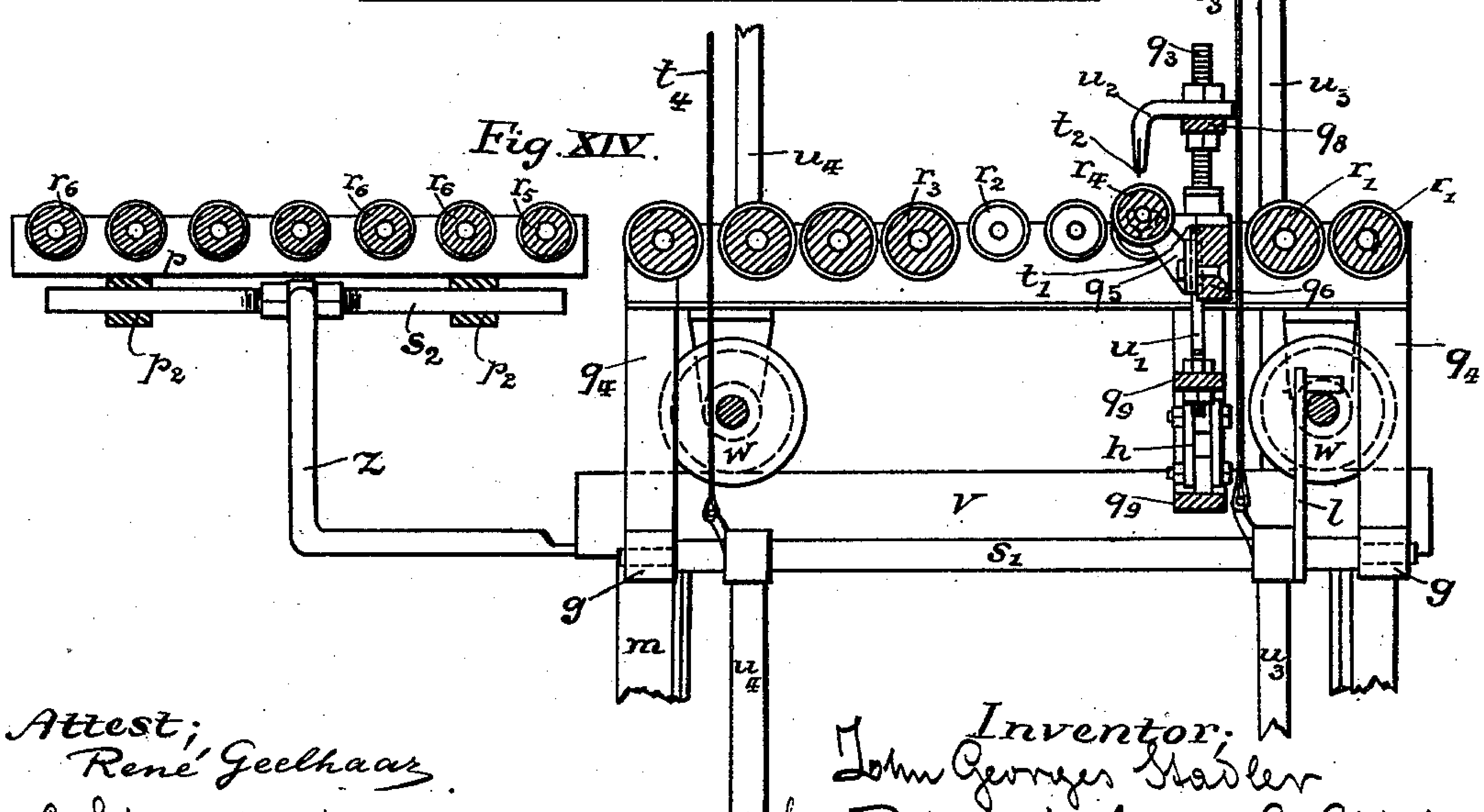


Fig. XIV.



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UNITED STATES PATENT OFFICE.

JOHN GEORGES STADLER, OF ROTHENBACH, BAVARIA, GERMANY.

BRICK AND TILE MACHINE.

SPECIFICATION forming part of Letters Patent No. 299,591, dated June 3, 1884.

Application filed January 11, 1884. (No model.) Patented in Germany March 10, 1883, No. 24,564.

To all whom it may concern:

Be it known that I, JOHN GEORGES STADLER, of Rothenbach, Bezirksaurt, Lindau, Bavaria, Germany, have invented certain new and useful Improvements in Brick or Tile Machines, of which the following is a specification.

My invention relates to improvements in tile-machines; and it consists, first, in giving said tiles a novel shape, which will cause the rain-water to be drained by means of parallel ridges; and, further, owing to the particular mode of overlapping of the tiles, when combined so as to form a roof, will prevent said tiles from getting caught and blown off by any strong wind.

My invention further consists in an improved apparatus called "tile-machines" for manufacturing said ridge-tiles, said apparatus being thus devised as to produce sound and homogeneous ridge-tiles, and to render the process of manufacturing as simple and continuous as the process of manufacturing ordinary tiles.

The ridge-tiles hitherto manufactured, though answering very well for the draining of rain-water, would form but an imperfect roofing for the reason that, owing to their strong projections, they were liable to be caught and blown off by any strong wind, which would thus uncover the roof. This fact had its cause indirectly in the inequality of the manufactured tiles, which, although agreeing well in their side joints, would fit imperfectly on that portion where the horizontal rows of tiles overlap each other, and in that portion certain hollows and strong projections would be created, which proved fatal in a strong wind.

By the molds and apparatus hitherto used it was impossible to manufacture ridge-tiles of exactly a like size and perfect shape, or of sufficient homogeneity, which will be explained forthwith. The molds through which the prepared clay is pressed from the kneading-machine, and which produce a clay band of a cross-section equal to that of the ridge-tile, were hitherto made of the same thickness all over, such that the clay flowing out from the mold would endure more friction at the borders of the band where the side joints are formed than at the middle portion; and, therefore, owing to this uneven friction, the band would flow easier at the middle portion, and would be more compact there than at the borders, where the clay band would show cracks and rents. The tiles manufactured from bands produced by means of such molds would be necessarily defective, as they would shrink unevenly in the drying process, and as in the burning process they would burn more and faster at the borders than at the middle portion, thus bending and warping, and very often cracking to pieces. The ridge-tiles, therefore, manufactured by the continuous process by means of molds of the same thickness everywhere would be very irregular in shape, and it would be impossible to have them fitting well together. With my improvements, however, all these defects are obviated, and ridge-tiles can be manufactured by the continuous process which are perfect and of thorough homogeneity, and of such uniform and novel shape that they can be made to fit one row close over the other, obviating, therefore, the obnoxious strong projections and hollows, and being less liable to be caught by a storm-wind.

In the accompanying drawings, Figure I represents a perspective view of part of a roof composed of my improved tiles. Fig. II represents a plan of one of my tiles; Fig. III, a cross-section thereof. Fig. IV represents the front view of the mold through which the clay is pressed, and by which the band of clay is formed. Fig. V represents a cross-section, and Fig. VI a plan, thereof. Fig. VII represents a side elevation thereof. Fig. VIII represents a sectional plan of the frame on which the continuous band of clay is cut into single tiles, and where the ears underneath the tiles and the middle ridge on top of the tiles are cut out. Fig. IX represents a side elevation of the same, and Fig. X, a sectional end elevation of one of the rollers conveying the clay band. Fig. XI is a plan of the same, and Fig. XII a vertical longitudinal section through the same. Fig. XIII represents a sectional end elevation of the whole frame, and Fig. XIV a part longitudinal section through the same.

Similar letters of reference in different figures indicate similar parts.

The novel shape of my ridge-tile, as given in Figs. I, II, and III, consists in parallel ridges—one in the middle, *a*, and one on each side, *d d*—said ridges thus forming two grooves, *b b*, for the drain of the rain-water.

The tile, as seen in cross-section in Fig. III, shows a band of uniform thickness, which is bent so as to form said ridges *a d d*, and which is provided at the borders with the grooves or joints *c c*, where two adjacent tiles are joining and locking each other. Underneath the grooves *b b*, on the bottom side of the tile and at its upper end, two ears, *e e*, are left projecting, whereby the tiles are held on the laths. The middle ridge, *a*, is thus devised that, as in Fig. I, the hollow groove *f*, formed thereby on the bottom side of the tile A, fits the joint-ridges *d d* of two subjacent tiles, B and C, said middle ridge further being cut down on the upper part of the tile and serving as butt-end for the two tiles of the next upper row overlapping-tile A. Middle ridge, *a*, of tile B, for instance, is cut off at its upper end so as to butt against the tiles D and A, and covering thus partly the joint *c c* of said tiles. This arrangement greatly reduces the projecting face offered to the wind, and creates on the roof continuous parallel ridges and corresponding grooves running from the top of the roof down to the gutter which drain the water perfectly and contributes greatly to the good appearance of the roof. Owing, further, to the fact that grooves *b b*, ridges *d d*, and groove *f* run uninterrupted all along the whole tile, the continuous process of manufacturing said tiles is facilitated by having the clay pressed through a form or mold, the hole of which is equal to the full cross-section of the tile, so as to create a band of clay, the cross-section of which shows ridges *d d* and *a*, and grooves *b b*, *c c*, and *f*, and, further, two ridges, *e e*, at the bottom side, which band is cut off into single tiles after having cut off ridges *e e* and *a* on the desired length. Such a form or mold is represented in Figs. IV, V, VI, and VII, said mold or form being longer on the middle portion of the cross-section of the tile, as seen in Fig. VI, so as to increase the friction of the band of clay in the center and to cause the clay to flow sidewise and to fill nicely the mold of the side ridges, *d* and *e e*, and of the grooves *c c*. The walls of the hole in the mold are made tapering and contracting toward the delivery end D of the mold; and in order to increase the friction for the middle portion the taper is increased for this part and made stronger than for the border portion, as may be seen in Fig. IV. The clay, therefore, entering the mold at F, which is the feed end of the mold, will be squeezed toward the borders and will be forced to fill them properly, the relative tapers on the middle portion of the mold, and on the border portion, and further, the swelling out of the mold on the middle portion, as seen in plan, being thus devised as to produce at the delivery end a sound clay band, which is everywhere equally compressed, and therefore perfectly homogeneous. With regard to the material of which the mold is constructed, it must be observed that owing to the great friction of the clay within said mold this latter has to be of very durable material—such as, for instance, iron, steel, or other metals, or also of glass, porcelain, and similar material. From the mold the clay is now delivered to the cutting and trimming apparatus called "tile-machine," which is illustrated in Figs. VIII, IX, X, XI, XII, XIII, and XIV, and which consists, mainly, of two parts—first of the cutting and trimming table, and of the dumping-table.

The cutting-and-trimming table is constructed with a square frame, $q_1\ q_1\ q_1\ q_1$, wherein a number of journaled rollers, $r_1\ r_1\ r_2\ r_2$, $r_3\ r_3\ r_3$, and r_4 are provided, said rollers serving for conveying and supporting the clay band, which is forced forward in the direction of the arrow over the rollers, turning these latter by frictional contact. Rollers $r_1\ r_1$ and $r_3\ r_3$, and $r_2\ r_2$ are located in the same horizontal plane. Roller r_4, however, is placed as much higher as the groove *f* is higher than the bottom face of the tiles, and is in width and shape adapted so as to run within said groove *f* with the purpose of supporting the middle ridge, which will be further explained hereinafter. Rollers $r_1\ r_1$ are supporting the clay band before it passes the trimming-wires $t_2\ t_1$, and therefore they are provided with two incisions, so as not to injure the two bottom ridges, out of which the ears of the tiles are to be cut, and in order to guide the clay band by receiving said bottom ridges. Rollers $r_3\ r_3$, however, are supporting the clay band after its passage of the wires, and are likewise provided each with two incisions, in order not to injure the ears cut out by wire t_1, which will be further explained hereinafter. Rollers $r_2\ r_2$, finally, are reaching from both sides merely up to the bottom ridges of the clay band and spare the space necessary for roller r_4 with bracket q_5. Rollers $r_1\ r_1$, $r_2\ r_2$, $r_3\ r_3$, therefore, are supporting the clay band only at its bottom face and prevent any injury to said band, guiding it at the same time, because the bottom ridges are guided by the incisions within said rollers. Roller r_4 being journaled within bracket q_5 is placed just underneath a horizontally-strained wire, t_2, which is provided on a bracket, u_2, said bracket bolted to a cross-bar, q_8, held rigid by two vertical studs, $q_3\ q_3$, which are rigidly connected by two further cross-bars, $q_9\ q_9$, and are guided vertically within sleeves cast onto a frame, $q_2\ q_2$, said frame bolted to frame q_1 of the cutting-table. Studs $q_3\ q_3$ are thus forming a frame, together with the rigidly-attached cross-bars q_8 and $q_9\ q_9$, said frame being free to slide up and down within sleeves of cast-iron frames $q_2\ q_2$, and being moved by means of lever h_0 with handle h_1, which is linked by means of link *h* to the lowest of the cross-bars q_9, lever h_0 being fulcrumed in bracket h_2, which is bolted onto frame q_1. Onto the upper cross-bar, q_9, two studs, $u_1\ u_1$, are rigidly attached, between which a horizontal wire, t_1, is extend-

ed, which wire serves to cut off or to trim the bottom ridges of the clay band as far as desired. Wires t_1 and t_2, which may be called the "trimming-wires," therefore may be moved upward or downward to a certain distance, together with frame $q_3\ q_3\ q_8\ q_9\ q_9$, by means of handle h_1. Bracket q_5 of roller r_4 is bolted to a cast-iron cross-piece, q_6, piece q_6 bolted to a cross-bar, q_7, which rigidly connects the length-beams of frame $q_1\ q_1$, and is sleeved onto studs $q_3\ q_3$ Piece q_6 is cut out, so as to leave free passage to the bottom ridges, $e\ e$, of the clay band. The position of the wires t_2 and t_1 as given in Fig. XIII is assumed when handle h_1 is in its highest position, and when the middle ridge of the clay band is cut off, and when simultaneously the ears at the bottom are left standing. Whenever wire t_2 is brought down so as to cut off the middle ridge, wire t_1, which is placed to the necessary amount backward from t_2, and which is rigidly fixed relatively to t_2, is brought downward, clearing the clay band perfectly, and therefore leaving the two bottom ridges standing. This position of Fig. XIII is therefore the one necessary to form the upper end of a tile where the middle ridge is cut off or trimmed and where the ears are projecting from the bottom face.

In order to form the lower part of the tile, where the bottom ridges are cut off, but where the middle ridge is left standing, handle h_1 has to be pressed downward, which will clear wire t_2 from the clay band and bring wire t_1 close underneath the bottom face of the clay band. By the forward motion of this band, therefore, the bottom ridges will be cut off continuously, while the top ridges are left standing until handle h_1 is released, whereupon the top ridge or middle ridge will be cut off and the bottom ridges will be left standing. Thus the cut-off middle ridge and the ears are formed on the tiles; and I shall now explain the parts and the process for cutting off the single tiles, which parts are also attached to the frame $q_1\ q_1$.

Underneath the frame $q_1\ q_1$ a horizontal shaft, s_1, is provided and journaled within two bearings, $g\ g$, which are formed of strong band-iron $q_4\ q_4$, and rigidly fixed to frame q_1. Two bow-shaped brackets, $u_3\ u_4$, are keyed onto shaft s_1 at a horizontal distance from each other equal to the length of a tile, and within said bows two wires, t_3 and t_4, are strained, which both simultaneously are brought to cut across the clay band as soon as a tile is to be cut off. For that purpose one of the bow-shaped brackets is provided with the handle h_2. Owing, however, to the forward motion of the clay band the tiles would not be cut off at right angles, however quick said wire should be moved, and therefore frame q_1 is put on wheels W, said wheels journaled in bearings fixed to frame q_1, and rolling on the rails V V of a strong table, $m\ m$, built of iron, and whenever the tiles have to be cut off, after the wires t_2 and t_1 have performed their duty, the whole frame q_1, with rollers $r_1\ r_1\ r_2\ r_2$, $r_3\ r_3$, r_4, shaft s_1, &c., is rolled forward in the direction of motion of the clay band and with its same speed, and then the handle h_2 is operated so as to cause the wires $t_3\ t_4$ to cut across through the clay band, which will now be cut at right angles. Then the brackets $u_3\ u_4$ are brought again in their original position by means of an arm, l, which is keyed on shaft s_1, and is provided at its end with a pin resting therewith on one axis of the wheels W of the cutting-table. (See also Fig. XIV.) The frame or carriage q_1 will be stopped when the cut-off tile is pushed forward again by the moving clay band. A square wooden frame, such as is generally used for drying ridge-tiles, is placed on top of the cut-off tile, which is now pulled upon the dumping-table by hand.

The dumping-table is constructed of a square frame, $p\ p\ p_1\ p_1$, which is provided with seven rollers, $r_5\ r_6$, the first one, which is of the same shape as the rollers r_3 or r_1 of the cutting-table, being also provided with two incisions for receiving the ears of the tile. The six next rollers, $r_6\ r_6$, are without incisions, because, as soon as the tile has arrived on the dumping-table, said tile stops its forward motion because the cutting-table or carriage is pushed off from the dumping-table and brought near to the kneading-machine, where the prepared clay is squeezed through the mold, as described in the above. The frame of the dumping-table is sleeved by means of bearings $p_2\ p_2$ on a shaft, s_2, which is held rigidly fast by means of an elbow, z, which again is bolted to the iron table m, and said frame $p\ p\ p_1\ p_1$ is thus balanced on said shaft s_2 that it rests on, one side of which is marked with M in Fig. VIII, by means of a blade, j, (seen in Fig. IX,) on the elbow z, and is easily turned upside down on the side opposite of M by hand. The dumping-table is also free to be slid in the direction of the shaft s_2, also by hand. Whenever a tile has arrived on the rollers $r_5\ r_6$, the dumping-table is slid off from the cutting-table and overturned, so that the tile comes to lie on the wooden frame which serves as guard and support for the drying of the tile in the sun. As soon as the tile has been dumped, the dumping-table is turned up again and slid toward the cutting-table, to receive a new tile.

It remains, now, to describe the mode of journaling the rollers of the apparatus: The rollers $r_1\ r_1$, $r_3\ r_3$, $r_5\ r_5$, and $r_6\ r_6$ are journaled, as is usual in such machines having the bearings proper protected from any sand or grit getting inside, by means of sleeved rings cast onto the bearings and extending over the shoulders of the shaft. It is not thought necessary to describe these further, and I proceed to describe the mode of journaling rollers r_2. These rollers are illustrated in Figs. X, XI, and XII. A rod forming the axis of the roller is bolted upon the length-beam of frame q_1, and further held rigid by means of a stand, r_7, clamping said rod tightly, said stand being bolted likewise to q_1. Together with this stand r_7 an angle-piece, r_8, is bolted down to

q_1, which piece, by means of its forked end, embraces the recessed end of roller r_2 and prevents said roller from slipping off the rod or axis, the roller r_2 being hollow and being sleeved onto said axis at both ends, as illustrated in Fig. XII. This mode of journaling effectually protects said rollers r_2 r_3 from grit and sand getting inside the bearings.

The process of manufacturing the ridge-tiles, by means of the tile-machine just described, is now as follows: Owing to the mold, as illustrated in Figs. IV, V, VI, and VII, being set and secured before the kneading-machine, a clay band of the proper cross-section is delivered, and is pushed forward, owing to the squeezing of the clay through the mold by the kneading-machine. This clay band is received by the cutting and trimming apparatus, by rolling the frame or carriage q_1 toward the mold, when wires t_3 t_4 will be in the position given in Fig. XIII, and wires t_1 t_2 in the uppermost position, so that wire t_2 is clearing the clay band, but wire t_1 striking close underneath the bottom face of the clay band. Therefore, the bottom ridges of said band will be continuously shaved or cut off by wire t_1. Owing to the advancing clay band, the top middle ridge, however, will be left standing. As soon as the front end of the clay band has passed wire t_4, lever h_0, and handle h_1 is dropped, and therefore wires t_1 t_2 are brought in the position of Fig. XIII, which will cause the middle ridge to be trimmed or shaved off, while at the bottom side of the clay band, at the proper distance backward, the bottom ridges will be left standing, and thus the ears will be formed. As soon as the ears have reached the desired length the carriage q_1 is moved along with the clay band and with the same speed, and by means of handle h_2 wires t_3 t_4 are cut rapidly through the clay band, and moved back again in their position as given in Fig. XIII. Thus the first tile has been cut off in perfect shape, and is received by the dumping-table, as will be explained hereinafter. Handle h_1 is then pressed down again, and frame or carriage q_1 is again approached to the mold, and owing to this movement, and to the forward motion of the clay band, very rapidly, the length of a new tile will be obtained, which, after having dropped again handle h_1, and having advanced again the carriage or frame q_1, is cut off like the first tile, with the difference, however, that it is cut off as soon as the front end of the clay band will have reached the wire t_4. This second tile, therefore, will be of exactly the same length of the first, and the process may be continued, and tiles of exactly a like size and shape will be received. As soon as one tile is cut off by wires t_3 t_4, a wooden frame is placed on top of it, and the tile is drawn and pulled on the dumping-table, which is slid near the cutting-table. Then the dumping-table is overturned, which will bring the tile to lie on top of the wooden frame in a suitable position for drying, whereupon the dumping-table is turned up again and is ready for the second tile. Thus a continuous process of manufacturing is obtained, and tiles of perfect uniformity.

I am aware that lateral grooves and ridges have been used in tiles which it was impossible to manufacture by the continuous process from a progressing clay band of uniform thickness, the cross-section of which was identical with the one of the tile; also, the side ridges and grooves have been used in combination with cross-ribs, which are necessary in those tiles, to prevent warping, owing to the fact that said tiles are not made of a band of uniform thickness. I do not claim, therefore, the use of parallel side ridges in tiles, but the particular and peculiar shape of the same, in combination with middle ridges.

I am well aware, also, that it is not new to use cutting or trimming wires strained between suitable frames or bows in order to cut off the tiles or bricks to their proper lengths; but I believe that it is new, in the manufacture of tiles of a shape similar to the one set forth in this specification, to use horizontally-strained wires mounted rigidly fast on a suitable vertically-sliding frame, said frame being operated by means of a hand-lever, by the attendant, for simultaneously shearing off the middle ridge on top of the tiles, and for leaving standing the ears on the bottom face of the tiles.

I am further aware that support or transport rollers have been used heretofore for conveying the bar or band of clay on the cutting-table. The particular shape, however, of my tiles, and the new process of trimming the top and bottom ridges of said tiles, require a special shape of side rollers, set forth in the foregoing and illustrated in the drawings, which rollers I believe to be new and essential for my manufacturing process, as the bearings of said side rollers are better protected against sand and grit than the rollers heretofore in use.

Having now fully described my invention, what I claim as new, and want to secure by Letters Patent, is—

1. In roofing devices, as a new article of manufacture, the parallel-ridge tile A, provided with the two border ridges *d d*, wherein the side joints, *c c*, are spared, in combination with the partly-cut-off middle ridge, *a*, and the channel *f*, formed thereby at the bottom of the tile, the grooves *b b*, formed between the ridges *d a d*, and the ears *e e* at the upper end of the bottom face of the tile, all substantially as shown, and for the purpose set forth and described.

2. In combination with a tile-machine, the die or mold, substantially as shown in Figs. IV, V, VI, and VII of the accompanying drawings, with the delivery end D and the feed end F, said mold provided at the middle portion of the hole with a swelling or thickening, and with greater taper on the walls on said portion of the hole than on the side borders of the same, for the purpose set forth and described.

3. In a tile-machine, the combination of an

attachment for simultaneously trimming the middle ridge and the ears of the tiles, consisting of horizontal cutting-wires strained within a vertical frame, said frame being movable, in the vertical sense, by means of a hand-lever within suitable guides attached to the cutting-table of the machine, the cutting-table constructed of a rectangular frame set on wheels, and supporting the suitably-shaped conveying-rollers for the clay band, and the device for cutting the tiles to their proper lengths, substantially as shown and described.

4. In a tile-machine, the combination of an attachment consisting of wires t_1 t_2, bracket u_2, studs u_1 u_1, cross-bars q_8 q_9 q_9, studs q_3 q_3, sleeves on frame q_2 q_2, lever h_0, with handle h_1, link h, and bracket h_3, the cutting-table consisting of frame q_1 q_1 q_4 q_4, wheels W W, bearings g g, shaft s_1, brackets u_3 u_3, wires t_3 t_4, rollers r_1 r_1, rollers r_2 r_2, r_3 r_3, roller r_4, bracket q_5, and cross-piece q_6.

5. In combination with a cutting-table of a machine for manufacturing parallel-ridge tiles, side rollers for guiding and supporting the clay band at its borders, constructed with hollow cast-iron caps journaled on pins secured to the frame of the cutting-table, said caps provided with inside bearings, and recessed corresponding to forked angles bolted to the frame of the cutting-table, substantially as shown, and for the purpose set forth and described.

6. In combination with the cutting-table of a machine for manufacturing parallel-ridge tiles, the recessed side rollers, r_2 r_2, mounted on beam q_1 of the cutting-table, and supporting the borders of the clay bands, stands r_7, and forked angles r_8, substantially as shown, and for the purpose set forth and described.

In testimony whereof I hereunto sign my name, in the presence of two subscribing witnesses, this 11th day of September, 1883.

JOHN GEORGES STADLER.

Witnesses:

EMANUEL LUDWIG,

AUGUSTE EGGIMANN.