

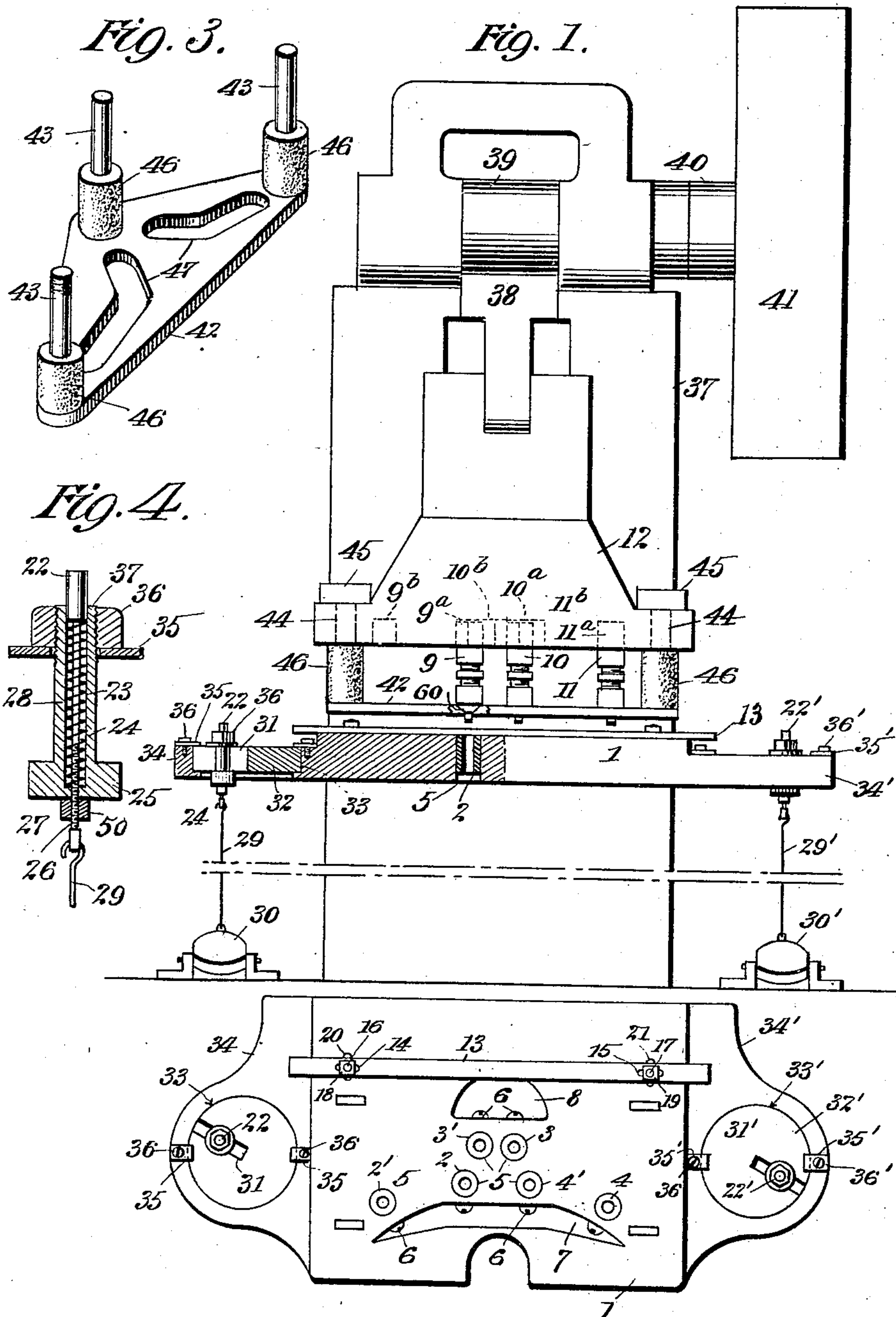
No. 868,428.

PATENTED OCT. 15, 1907.

M. GROSSMAN.
MACHINE FOR PUNCHING STAIR STRINGERS.

APPLICATION FILED MAR. 8, 1907.

2 SHEETS—SHEET 1.



Witnesses:
Francis Ober
A. M. Hayes

Fig. 2.
Martin Grossman Inventor
By his Attorney Robert H. Moore.

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2 SHEETS—SHEET 2.

Fig. 5.

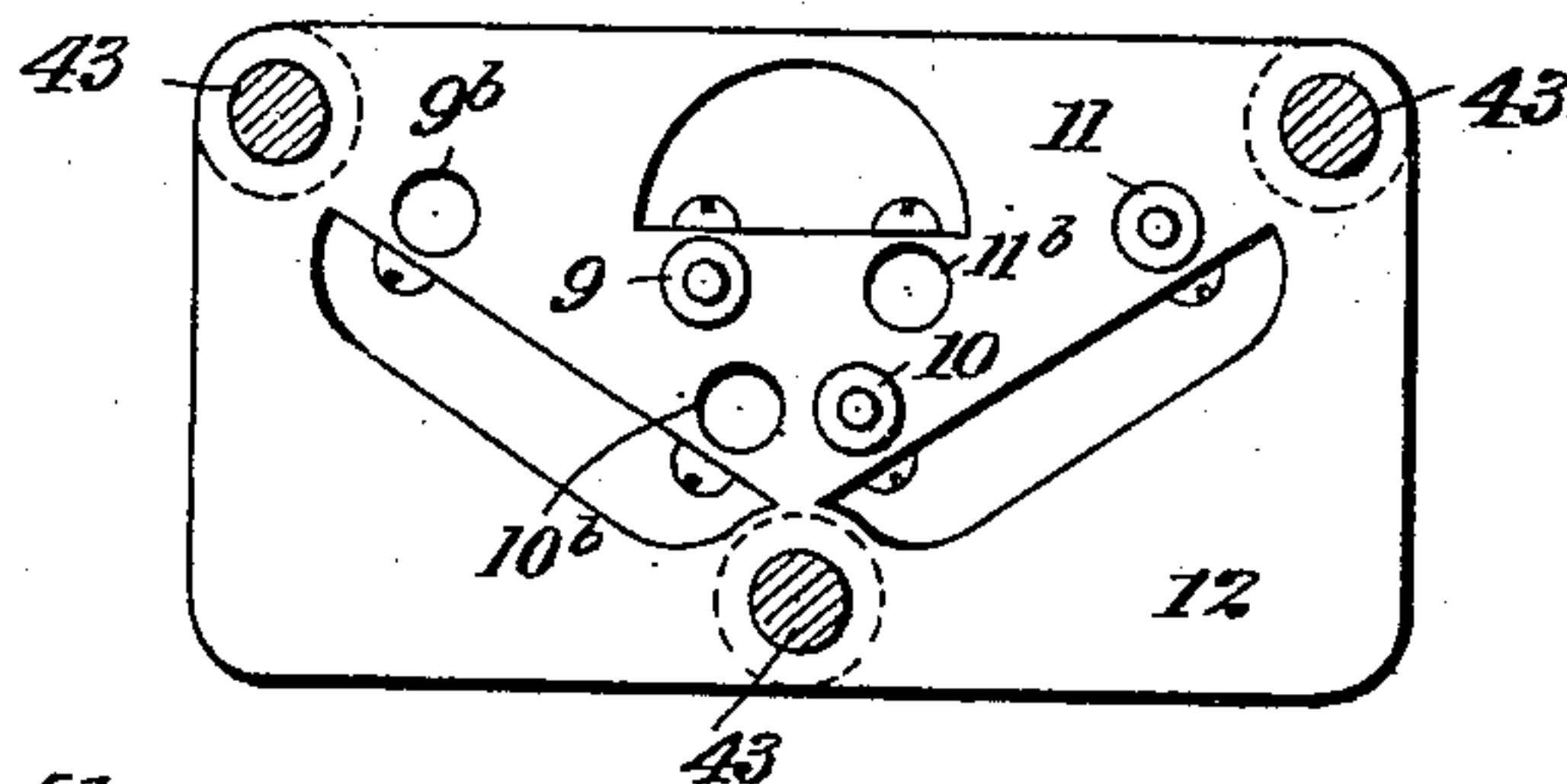


Fig. 8.

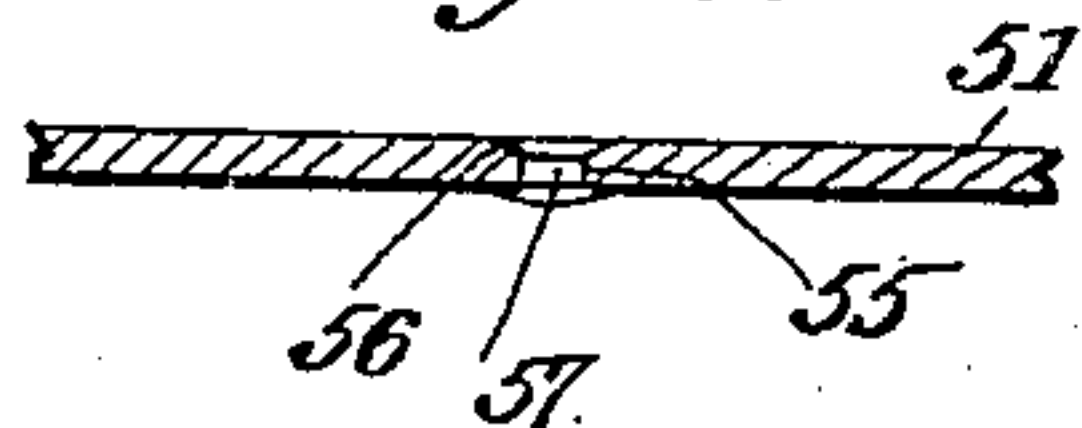


Fig. 6.

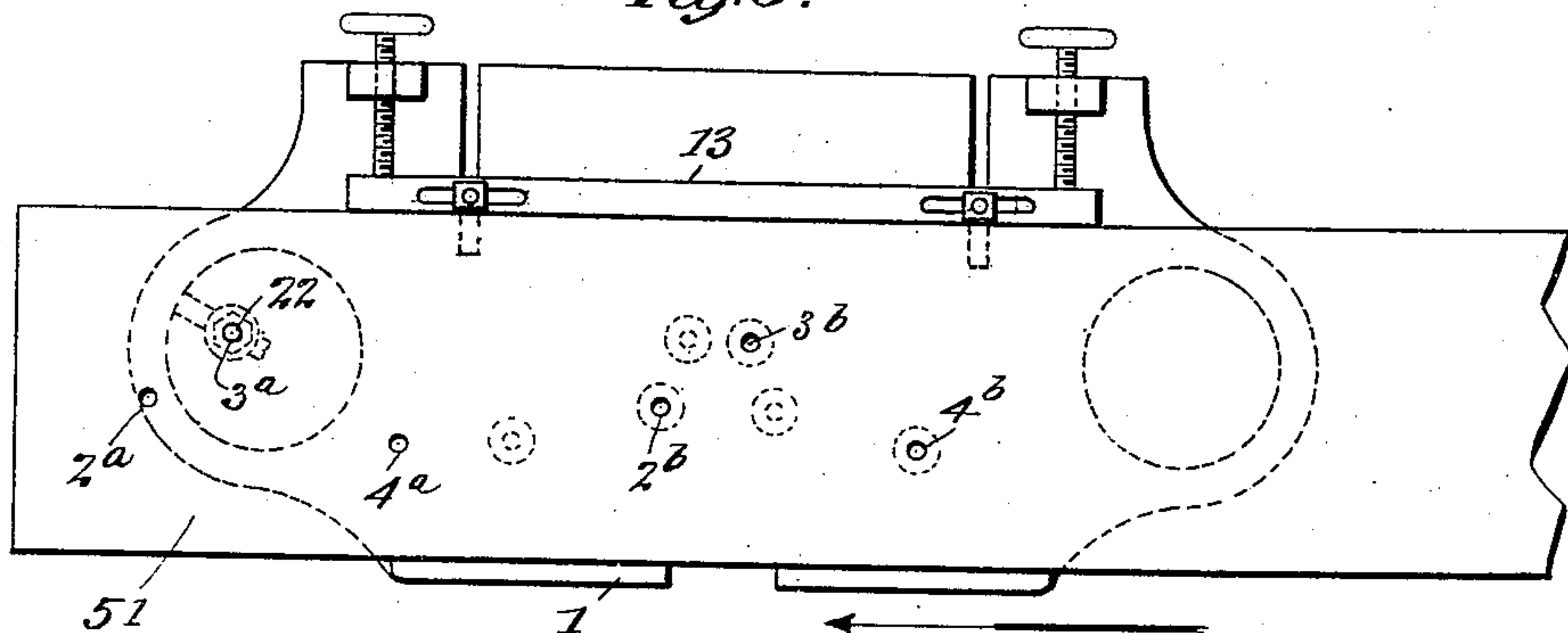
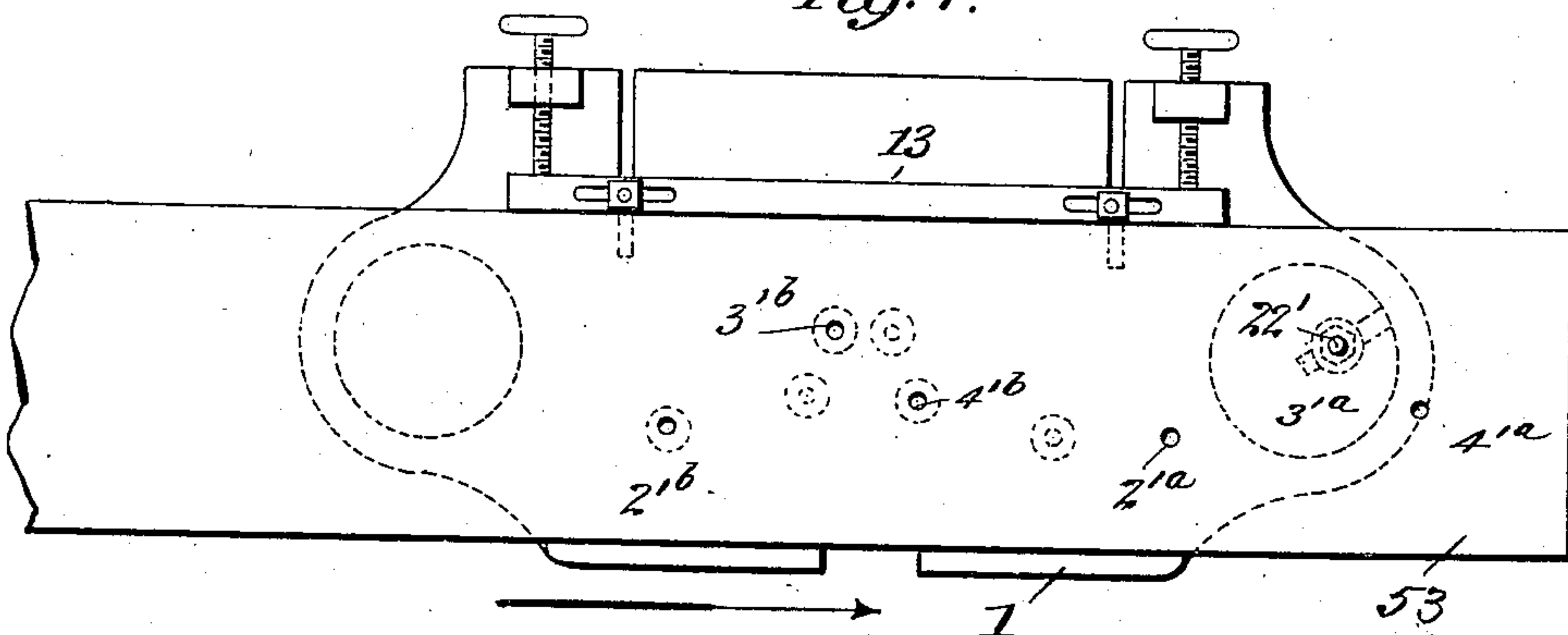


Fig. 7.



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A. M. Hayes.

Martin Grossman Inventor
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UNITED STATES PATENT OFFICE.

MARTIN GROSSMAN, OF NEW YORK, N. Y.

MACHINE FOR PUNCHING STAIR-STRINGERS.

No. 868,428.

Specification of Letters Patent.

Patented Oct. 15, 1907.

Application filed March 8, 1907. Serial No. 361,265.

To all whom it may concern:

Be it known that I, MARTIN GROSSMAN, a citizen of the United States, residing in the borough of Manhattan, New York city, county and State of New York, have
5 invented certain new and useful Improvements in Machines for Punching Stair-Stringers, of which the following is such a full, clear, and exact description as will enable any one skilled in the art to which it appertains to make and use the same, reference being had to the
10 accompanying drawings, forming part of this specification.

My invention relates to machines for punching at one operation a set of holes in metallic stringers for stairs, which set of holes constitute the rivet holes by which
15 an adjacent riser and tread, or the supports therefor, are secured to the stringer.

The particular objects of my invention are to provide means whereby the position of the group of punching tools may be readily changed so as to punch
20 the rivet holes for each of a pair of oppositely arranged stringers; and, further to provide positioning means which are adapted to enter a previously punched hole in the stringer and which has the capacity of adjustment in a circle or on an arc and also has the capacity of radial adjustment; and further provide a positioning pin which may be readily retracted from its operative position, in order to shift the stringer to punch another set of holes, and to provide locking means for holding one of the positioning pins in retracted
25 position during the time the other pin is in use.

With these and other objects in view, my invention consists in the various peculiar arrangements and combinations of the several different parts of the apparatus, all as hereinafter fully described and then
30 pointed out in the claims.

I have illustrated a type of my invention in the accompanying drawings, wherein:—

Figure 1 is a front view of my improved punching machine with the support for the table omitted and
40 part of the table in vertical section. Fig. 2 is a top plan view of the punching table. Fig. 3 is a perspective view of the presser device and punch guide, shown as detached from the machine. Fig. 4 is an enlarged central vertical view of the spring mounted positioning pin shown as detached from the adjustable disk or member which carries it. Fig. 5 is an underside view of the punching tools and its carrier, with the presser device omitted. Fig. 6 is a diagrammatic view showing the stringer in position on the machine table and in
50 which one set of rivet holes has been punched and the stringer has been shifted so that the positioning pin engages one of the punched holes and brings the stringer in true position for punching of the next succeeding set of rivet holes. Fig. 7 is a similar view to that shown in Fig. 6 but of the opposite stringer, to that shown in Fig. 6, the two stringers shown in Figs. 6 and

7 being supposed to be used at opposite sides of the same stairs. Fig. 8 is a cross sectional view of the stringer, showing the rivet hole punched with a countersink therein and with a rivet set therein.

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Referring to the drawings, in which like numbers of reference designate like parts throughout, 1 is a table or platform which is suitably supported in the machine in fixed position and in which is mounted two separate sets or groups of three dies each, 2, 3, 4 and 2', 3', 4', respectively, each of which is removably secured
65 on a socket 5 by means of a set screw 6, the surface of the table being formed with depressions 7 and 8 to give access to the set screws which engage the dies.

As it is only necessary to punch three holes for each adjacent riser and tread, I use only three punching
70 tools at a time, namely, 9, 10 and 11, which in Fig. 1 are shown as mounted in a vertically reciprocating carrier 12 in sockets 9^a, 10^a and 11^a which correspond in triangular relation with the disposition of the dies
75 2, 3 and 4, respectively, on the punching table 1. When the punching tools 9, 10 and 11, are grouped as shown, they punch simultaneously a set of three holes corresponding to dies 2, 3 and 4, and this operation is repeated by shifting the stringer lengthwise across the
80 table the same distance each time, the stringer thus punched serving as one of a pair of stringers, say, for example, the left hand one, looking up the stairs. Each stringer thus punched is a duplicate of the other, provided the other adjustments of the machine hereinafter referred to, remain the same, Fig. 6 showing a
85 diagram of the so-called left hand stringer being punched in the machine. In order to punch a set of three rivet holes for the other stringer of a pair, the right hand one, the three punching tools 9, 10 and 11 are removed from
90 the positions shown in Fig. 1 and are placed in the other set of three sockets 9^b, 10^b, 11^b, in the carrier and which sustain the tools in the reverse triangular relation, the triangle formed by joining the axis of each tool by straight lines being of the same size as the triangle on
95 which the tools were previously arranged, so that the punching tools thus reset correspond with the disposition of the dies 2', 3' and 4', on the punching table, and the stringer which is to be made the right hand one is put through the machine in the manner just described,
100 and the tools punch a set of three holes simultaneously at each operation, as shown in Fig. 7. It will thus be seen that by re-setting the gang or set of three triangularly arranged tools and reversing the movement of the stringer across the table, the mate or other one of a pair of stringers may be readily formed. In practical
105 work this is found to be a very important feature as a pair of punched stringers can thus be made to exactly correspond, and, furthermore, where the sheet metal stringer is ornamented upon the exterior or is formed
110 with projections thereon, it can only be put through the machine with the flat back thereof resting on the

punching table, so that with such a construction of stringer, an operator cannot form a corresponding one of a pair by putting it through the machine upside down.

- 5 Upon the punching table is arranged a gage bar 13, which is provided near its ends with longitudinal slots 14, 15, through which pass clamping bolts 16, 17, respectively, such bolts having nuts 18, 19, upon their upper ends and which clamp against the gage bar.
- 10 These bolts 16 and 17 extend into slots 20, 21, respectively, which extend in a direction from the rear toward the front of the table 1. By this arrangement the gage bar 13 may be bodily moved back and forth on the table and clamped in its adjusted position and
- 15 in parallel relation with the front edge of the table, or the gage bar 13 may be set at an angle obliquely and in a reverse direction, by loosening one or the other of the clamping bolts and moving the bar at that end either toward the front or the rear of the table.
- 20 The sets of rivet holes are located equal distances apart, measured longitudinally of the stringer, by means of a positioning device which engages one of the previously punched holes, after the stringer is shifted longitudinally on the table and as the machine
- 25 in adapted to punch the opposite stringer of a pair, there are two of such positioning devices, one of which only is operated at a time. These positioning devices are each constructed alike and a description of one will suffice for both of them, they being distinguished
- 30 in the drawings by one of them having a prime mark applied to the reference numerals. The positioning device comprises a vertically movable pin 22 which is set in a socket 23 formed in a piece 24 having a head 25, at its lower end. From the underside of the pin
- 35 22 extends a rod 26 which passes through a perforation 27 in the lower end of the socket 23 of the piece 24, and a coil spring 28 surrounds the rod 26 and is interposed between the pin 22 and the bottom of the socket 23 so as to normally keep the pin pressed outwardly, and
- 40 a link 29 is connected between the rod 26 and a treadle 30 located on the floor beneath the punching machine, and by means of which the operator may with his foot readily retract the pin 22 within its socket, when the stringer is to be moved across the table for punching
- 45 the next succeeding set of holes. The socketed piece 24 which carries the pin extends through a radially disposed slot 31 formed in a circular member or disk 32 which is set in a recess 33 at the side of the table or in a wing 34 extending from the table. The piece 24
- 50 projects up above the disk and is surrounded by a washer 35 above which is a nut 36 which works on a screw thread 37 on the exterior of the socketed piece 24. As the head 25 of the socketed piece engages the disk 32 on its underside, the pin 22, or what is the
- 55 same thing, the piece 24, can be adjusted along the length of the slot 31 at any point thereof and held in such position by turning down the nut 36 which will serve to bind the parts in adjusted position. The disk or circular member 32 is so mounted in the recess
- 60 33 that it may be turned on its center, so that the slot 31 may be made to project radially in any direction on the circle. As the part 24 carrying the positioning pin 22 is adjustable along the length of the radial slot 31, it will thus be seen that this rectilinear adjust-
- 65 ment combined with the adjustment of the disk on its

axis will permit of the pin being adjusted to practically any point within the area covered by the disk. The disk 32 is held down within the recess 33 by means of small plates 35, which are fastened by screws 36 to the table or wing 34, the plates projecting over upon the disk as indicated in the drawings and when the screws 36 are turned down hard they serve to clamp the disk in fixed position. When it is desired to turn the disk slightly on its axis to adjust the pin 22, the clamping plates 35 are released for the time being.

The positioning pin 22 can be held locked in retracted position, by means of a nut 50 which works on a screw thread on the rod 26 connected with the pin, by screwing the nut upwardly on the rod when the pin is drawn down and this will serve to lock the parts together so that the spring cannot force the pin upwardly.

The punching tool carrier 12 reciprocates vertically on the frame 37 being operated by a pitman 38 which is actuated by a cam or eccentric 39 on the shaft 40 which is operated by a belt wheel 41. Upon its underside the tool carrier 12 is provided with a stripper device comprising a plate 42 with the supporting rods 43 which extend up through perforations 44 in the carrier and are provided upon their upper ends with nuts 45. Each of the supporting rods 43 is surrounded by a rubber spring or cushion 46 which is interposed between the presser plate 42 and the underside of the carrier 12. The rods 43 being mounted to slide easily in the perforations 44, the rubber cushions 46 are compressed each time the carrier descends and the presser plate 42 bears upon the work on the table. The stripper plate is formed with irregular slots 47, for the set of punching tools to operate through when adjusted upon one side or the other of the carrier.

In operating this punching machine, a pattern having say two groups of three holes each punched therein in the proper position to give the desired size of riser and tread, is placed on the table in which pins have been temporarily set in the three dies which are to be used, and then the gage bar is brought snugly against the inner long edge of the stringer and secured rigidly in place, at the same time the pin 22 at the left hand side of the machine is adjusted so that it enters a certain one of the set of three previously punched holes, say the hole corresponding to the die 3, of the set of dies 2, 3 and 4. The positioning pin 22 is then made fast in this adjusted position and the pattern is removed likewise the pins which have been inserted in the set of dies and the machine is then in the proper adjustment to put through it a stringer and have the sets of holes simultaneously punched therein in accordance with the pattern, one of the holes of a set being entered by the positioning pin 22 each time the stringer is shifted to punch a new set of holes, and thus the spacing of the sets of holes is made uniform. After a sufficient number of the stringers for one side of a pair, say the left hand side looking up the stairs, have been punched, the punching tools 9, 10, and 11 are transposed from the position shown in Fig. 1 and are inserted in the sockets 9^b, 10^b, and 11^b, so that they operate with the three dies 2', 3' and 4' of the table. The pattern may then again be applied in order to find the opposite adjustment for the positioning pin 22' at the opposite side of the machine and which is now to be used, the other positioning pin 22 being locked in retracted po-

sition to keep it out of the way. After the positioning pin 22' has been properly adjusted the stringer is then put through the machine in the same manner but in an opposite direction to that previously described, and thus the stringers for the opposite side of the stairs are punched and have the rivet holes thereof accurately located, so that they can be placed in true alinement with the rivet holes of the opposite stringer of a pair.

In ordinary usage, the height of the risers of stairs is seven and a half, or seven and three-quarters or eight inches, while the width or depth of the treads is nine, or nine and a half, or ten inches. In this form of punching machine, in which the three holes are simultaneously punched, the proportion between the adjacent riser and tread is varied by setting the gage bar 13 at a slight angle or obliquely across the table and this may be done in accordance with the requirements of the particular case. By virtue of the wide range of adjustment of the positioning pin in my present machine, the same can be made to engage practically any one of the holes of the set of three holes, and this in itself affords considerable variety in the work. With the ordinary adjustments and with the positioning pin engaging, say the innermost hole (corresponding to the innermost die 3 or 3'), I can readily vary the size of the riser anywhere between five to nine inches and the size of the tread from between seven to twelve inches.

In the diagram shown in Fig. 6 the stringer 51, which may be supposed to be the left hand one of the pair, is shown as being moved through the machine in the direction of the adjacent arrow and with two sets of holes having been punched, the innermost hole 3^a, of the first set of holes (2^a, 3^a and 4^a), being engaged by the positioning pin 22, upon the withdrawal of which the innermost hole 3^b of the second set of holes (2^b, 3^b, 4^b) is caused to be entered by the pin 22, to position the stringer for the punching of the next set of holes. In this diagram the gage bar 13 is set parallel with the front edge of the table and each stringer thus passed through the machine has its inner long edge constantly in contact with the gage bar during the punching operation, and the stringers thus produced are exact duplicates of each other and are for the same side of the stairs.

In Fig. 7 the stringer 53 is shown as being moved through the machine in the direction of the adjacent arrow and in an opposite direction to that shown in Fig. 6, and this stringer forms the mate for the opposite side of the stairs to the stringer 51 shown in Fig. 6. In this Fig. 7 the gage bar remains set in the same position as shown in Fig. 6 but the positioning pin 22 is withdrawn from use while the positioning pin 22' at the opposite side of the machine is brought into play and this is shown as engaging the innermost hole of the first set of punched holes and which has been punched by the punches re-set in the holders 9^b, 10^b and 11^b and in which re-set position the punches cooperate with the dies 2', 3' and 4', punching the set of holes 2'^a, 3'^a and 4'^a and the second set of 2'^b, 3'^b and 4'^b, thus making a right hand stringer to be used in conjunction with the one punched in Fig. 6.

Each of the punching tools 9, 10 and 11 are provided a short distance above the cutting or punching end with an upwardly tapering or conical shoulder 60 (Fig. 1), which is for the purpose of forming or pressing a corresponding countersink 56, as shown in Fig. 8, at one end

of the rivet hole 55 punched in the stringer 51. This rivet hole is adapted to receive the rivet 57 and its conical head so that such head is countersunk in the adjacent surface of the stringer 51, in order to make the rivet hole flush with the surface thereof. This is an important feature in my invention and the stringers formed in this way with the rivet heads flush, present a very finished appearance.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. In an apparatus for punching rivet holes in stair stringers, the combination of a table, a reciprocating carrier and a set of punches carried thereby, the said punches being adjustable in differently arranged groups, whereby the apparatus is adapted to punch rivet holes in opposite stringers of a pair, and adjustable positioning means arranged at opposite ends of said table, respectively, adapted to enter a previously punched hole in the stringer.

2. In an apparatus for punching rivet holes in stair stringers, the combination of a table, a reciprocating carrier provided with different groups of holders or sockets for the punches, the said holders or sockets of each group being in triangular relation, whereby when the punches are carried by one group of triangularly disposed holders or sockets they are adapted to punch the rivet holes for one stringer of a pair and when carried by the other group of sockets or holders they are adapted to punch rivet holes for the other stringer of said pair, and adjustable positioning means arranged at opposite ends of said table, respectively, adapted to enter a previously punched hole in the stringer.

3. In an apparatus for punching rivet holes in stair stringers, the combination of a table, means for forming groups of rivet holes for the risers and treads, and means for relatively changing the relation of said hole forming means relative to a longitudinal edge of the stringer, whereby the apparatus is adapted to punch for differently proportioned risers and treads, and adjustable positioning means adapted to enter a previously punched hole in the stringer and having capacity of adjustment in an arc.

4. In an apparatus for punching rivet holes in stair stringers, the combination of a table, means for forming groups of rivet holes for the risers and treads, and means for relatively changing the relation of said hole forming means relative to a longitudinal edge of the stringer, whereby the apparatus is adapted to punch for differently proportioned risers and treads, and adjustable positioning means adapted to enter a previously punched hole in the stringer and having capacity of adjustment in an arc and also radially in respect to said arc.

5. In an apparatus for punching rivet holes in stair stringers, the combination of a table, means for forming groups of rivet holes for the risers and treads, and means for relatively changing the relation of said hole forming means relative to a longitudinal edge of the stringer, whereby the apparatus is adapted to punch for differently proportioned risers and treads, and adjustable positioning means adapted to enter a previously punched hole in the stringer and such means comprising an adjustable disk or member provided with a slot or way and having a positioning pin adjustably mounted therein.

6. In an apparatus for punching rivet holes in stair stringers, the combination of a table, means for forming groups of rivet holes for the risers and treads, and means for relatively changing the relation of said hole forming means relative to a longitudinal edge of the stringer, whereby the apparatus is adapted to punch for differently proportioned risers and treads, and adjustable positioning means adapted to enter a previously punched hole in the stringer and such means comprising a circular member or disk adjustable angularly on its center and provided with a radial slot or way, and a positioning pin adjustable along the length of said slot.

7. In an apparatus for punching rivet holes in stair stringers, the combination of a table, means for forming groups of rivet holes for the risers and treads, and means for relatively changing the relation of said hole forming means relative to a longitudinal edge of the stringer,

whereby the apparatus is adapted to punch for differently proportioned risers and treads, an adjustable positioning pin projecting above the surface of the table to enter a previously punched hole in the stringer, said pin being
 5 spring mounted and adapted to be retracted to withdraw it from a punched hole, and means for retracting it.

8. In an apparatus for punching rivet holes in stair stringers, the combination of a table, means for forming groups of rivet holes for the risers and treads, and means
 10 for relatively changing the relation of said hole forming means relative to a longitudinal edge of the stringer, whereby the apparatus is adapted to punch for differently proportioned risers and treads, an adjustable position-
 15 ing pin projecting above the surface of the table to enter a previously punched hole in the stringer, said pin being spring mounted and adapted to be retracted to withdraw it from a punched hole, means for retracting it and means for locking it in retracted position.

9. In an apparatus for punching rivet holes in stair
 20 stringers, the combination of a table, a reciprocating carrier and a set of punches carried thereby, the said punches being adjustable in differently arranged groups, whereby the apparatus is adapted to punch rivet holes in opposite

stringers of a pair, and adjustable positioning mechanisms adapted to enter a previously punched hole in the stringer
 25 to position it for the punching of the next set of holes, one such positioning mechanism being adapted for one stringer of a pair and the other mechanism for the other stringer.

10. In an apparatus for punching rivet holes in stair
 30 stringers, the combination of a table, a reciprocating carrier and a set of punches carrier thereby, the same punches being adjustable in differently arranged groups, whereby the apparatus is adapted to punch rivet holes in opposite
 35 stringers of a pair, and adjustable positioning pins adapted to enter a previously punched hole in the stringer to position it for punching the next set of holes, one of said pins being adapted for positioning one stringer of a pair and the other pin the other stringer.

In testimony whereof, I have hereunto set my hand in
 40 the presence of the two subscribing witnesses.

MARTIN GROSSMAN.

Witnesses:

SAMUEL KAHAN,
 BERNARD S. DEUTSCH.