

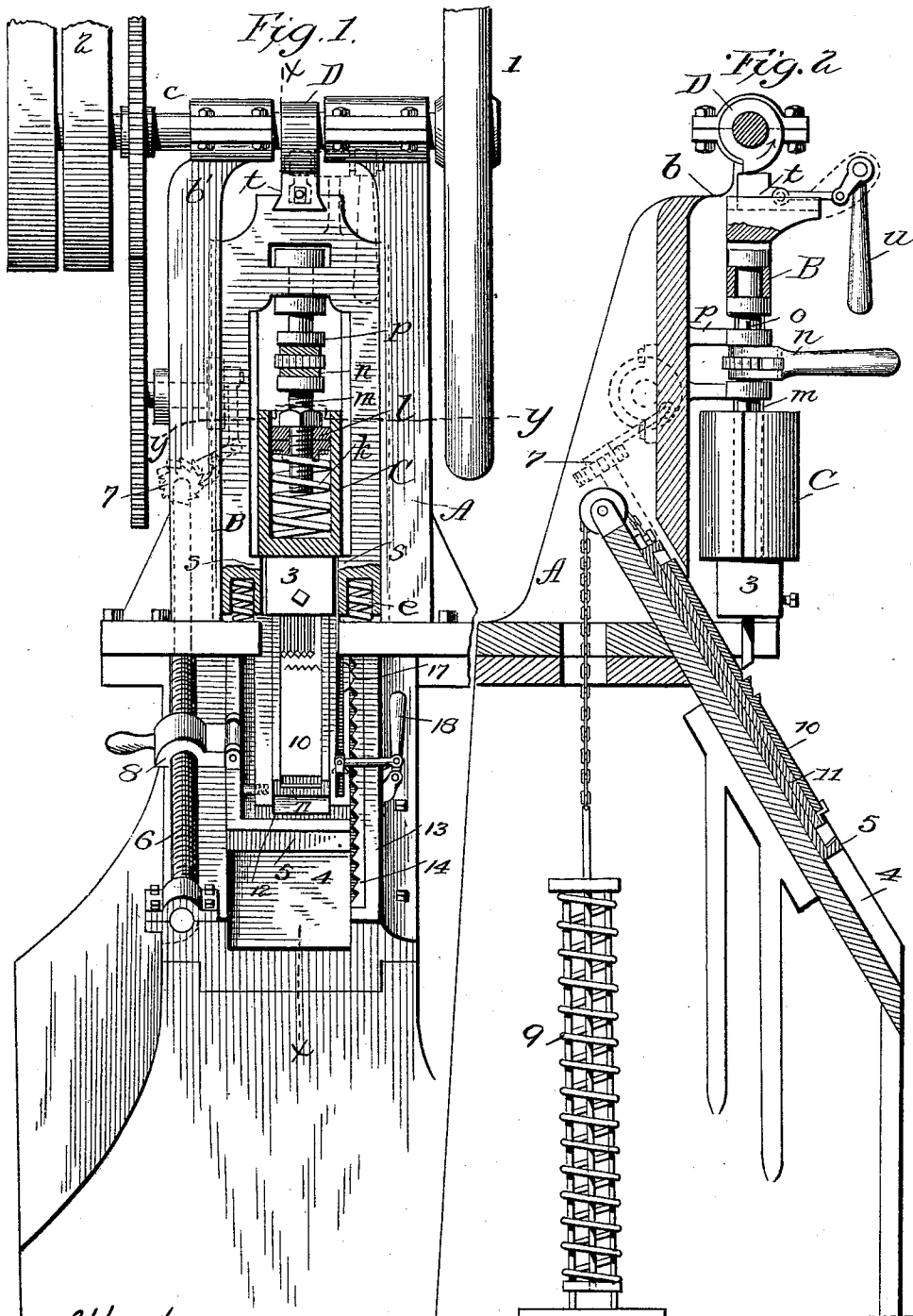
(No Model.)

2 Sheets—Sheet 1.

J. H. STOKES.
MACHINE FOR MAKING RASPS.

No. 521,424.

Patented June 12, 1894.



Attest
Milton Malden
F. L. Middleton

Inventor
John H. Stokes
by Ellis Spear -
ATTY.

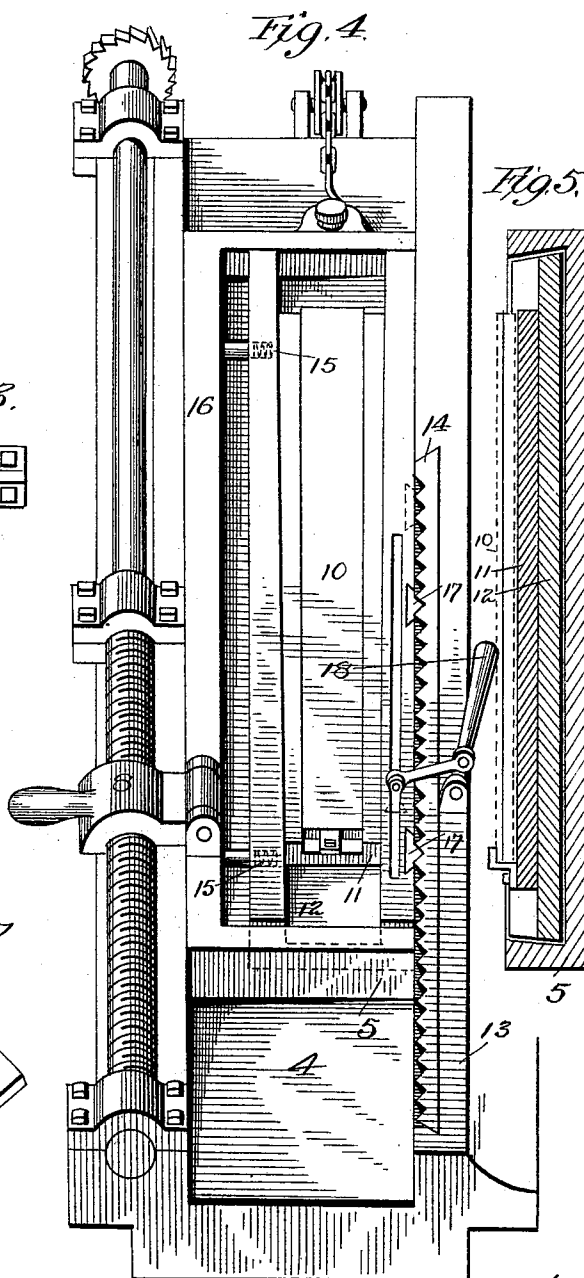
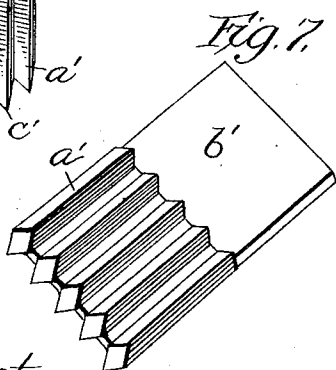
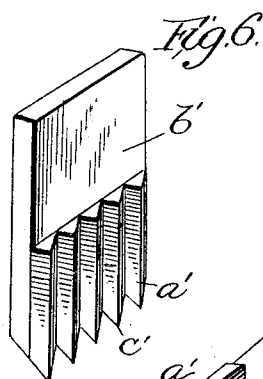
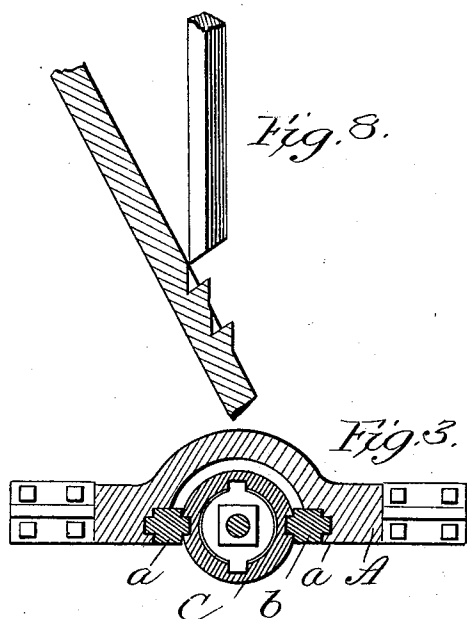
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2 Sheets—Sheet 2.

J. H. STOKES.
MACHINE FOR MAKING RASPS.

No. 521,424.

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UNITED STATES PATENT OFFICE.

JOHN H. STOKES, OF FREEHOLD, NEW JERSEY, ASSIGNOR TO THE STOKES
BROS. MANUFACTURING COMPANY, OF SAME PLACE.

MACHINE FOR MAKING RASPS.

SPECIFICATION forming part of Letters Patent No. 521,424, dated June 12, 1894.

Application filed March 2, 1892. Serial No. 423,503. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. STOKES, a citizen of the United States of America, residing at Freehold, in the county of Monmouth and State of New Jersey, have invented certain new and useful Improvements in Machines for Making Rasps, of which the following is a specification.

Heretofore in the manufacture of rasps by machinery it has been found essential to make teeth by raising them from the surface of the blank by means of a pivotally yielding punch, the cutting end of which penetrates the metal at an angle to the face thereof, describing a circle to lift the metal out of the recess formed to make the projecting tooth, and this movement of the point of the punch has been found to be necessary, for if the punch entered the metal direct at the ordinary angle at which the blank and punch are held relatively to each other an indentation only in the metal would result. I have found however, by experiment, that by increasing the angle at which the blank is held relatively to the punch and changing the form of the punch as hereinafter explained the punch may have a positive downward movement into the metal of the blank without any forward or pivotal movement of its penetrating end as has been heretofore found necessary; this action making a recess, the walls of which are practically at right angles meeting on a straight line at the bottom of the recess, the teeth formed being in all particulars similar to those heretofore formed by the old process. In the old method, while the result was very satisfactory the means for producing the result were objectionable in many particulars. In the old method it was impossible to use a gang of punches as they could not be given the required pivotal movement successfully on account of the unevenness of the blank surface causing lack of uniformity in the action of the different punches of the gang and resulting in imperfect work and breakage of the punches. Further than this the condition of the punch or punches affected the extent and time of the pivotally yielding action, as a newly ground tooth required but about half the movement to make

a tooth, as that needed by a slightly worn punch, and thus this was particularly fatal to the use of a gang of punches for unless they all yielded at the same time so as to have movement in unison and an equal movement the result would be disastrous, and in fact these objections have been so serious that practically it has been impossible to use a gang of punches in the formation of teeth by the old method. These objections have been attended with serious results too in the use of a single punch, as the wear upon the punch was material great care in the grinding of the punches was necessary and even then the peculiar movement of the end of the punch rendered it liable to break at any time. By the present improvement I render unnecessary the use of the pivotally yielding punch holder and thus obviate the necessity for the peculiar movement of the punch which materially lessens the wear, renders it possible to use a simple form of punch which is easily made; obviates danger of breakage and enables me to use a gang with perfect results for the reason that the movement of the gang is uniform and positive and simply penetrates the metal on a straight line to form the teeth.

In the accompanying drawings: Figure 1 represents a front elevation of the machine partly in section. Fig. 2 is a sectional view of the same a quarter turned on the line $x-x$, Fig. 1, showing a blank partially operated upon. Fig. 3 is a section on line $y-y$ of Fig. 1. Figs. 4 and 5 are detail views of the table for the blank. Figs. 6 and 7 show forms of gang punches. Fig. 8 is a detail view of the blank and punch made on a larger scale than Figs. 1 and 2.

A represents the frame work which incloses the reciprocating frame B, which as shown in Fig. 3, is guided in its up and down movement in the said frame A by means of ways. The frame A is arched at its upper end as at b' and bearings are formed for a shaft c carrying a balance wheel 1 and band wheels 2. A cam D is centrally arranged on the shaft, the cam and shaft moving in the direction of the arrow. The frame B is depressed by the high part of the cam to give the punching action and as soon as the shoulder of the cam has

passed, springs *e*, force the frame B upward lifting the punch for another blow. These springs *e* may be adjusted in any suitable way to give them the proper tension.

5 The frame B is made of rectangular form and within its side walls is located the cylinder C carrying upon its lower end a projection 3 made very strong for the purpose of supporting the punch or gang. The punch
10 or gang may be securely held by a set screw or other suitable means.

As the blanks are of varying thickness and as it is desirable to have the teeth of uniform height I have aimed to provide a construction
15 of apparatus which will cause the teeth to be made uniform without regard to the irregularity of the thickness of the metal of the blank and this is attained by providing a definite determined movement of the punch by
20 the action of the cam in relation to the thickness of the blanks and the amount of resistance offered. Thus in the thinner portions, the full movement of the punch is permitted and makes a tooth of the determined height
25 while in the thicker portions the punch will penetrate the metal sufficiently to make a tooth of the same height but beyond this by reason of the increased resistance the movement imparted by the cam will be absorbed
30 by a spring interposed between the punch and the source of power which is adjusted to act at a certain resistance, while without some means of taking up this surplus movement it is apparent that in the thicker portions
35 of the blank, teeth of greater height would be formed and the teeth would thus vary according to the variations in the thickness of the blank. In carrying out this part of the invention I place within the cylinder
40 C a coiled spring and above the spring I place a disk *l* threaded upon the stem *m* which is swiveled at its upper end in the frame B. It will be seen that the blow delivered by the cam D upon the frame B is transmitted to
45 the tool through the stem *m* and its disk and the spring *k* and cylinder C, but the spring is of such tension as to be unyielding in its action, except under the conditions stated.

In order to adjust the tension of the spring
50 *k*, I spline a ratchet lever *n* upon the stem *m*, which is provided with a feather *o*, the lever being held between the projections *p*, extending from the frame. By the turning of this lever the tension of the spring may be increased or diminished by reason of the fact
55 that the screw threaded end of the stem engages the disk *l*, and in the rotation of the stem this disk is either moved downwardly against the spring to increase its tension or
60 upwardly to diminish its power. In order to prevent any change in the position of the cylinder C and the frame B by reason of such adjustment of the spring I form a stop to prevent the upward movement of the frame by
65 means of the shoulders *s*, bearing against the lower edge of the cylinder C.

In order to very quickly throw the punch

out of operation without stopping the rest of the machinery I provide a slide *t* on the upper end of the frame B which has a handle *u*,
70 and by means of this handle the slide may be withdrawn from under the cam and thus rotation of the cam will be effected without action upon the frame B. In order to regulate the force of the blow I move the slide beneath
75 the cam so as to receive a full or partial action therefrom.

As I have before stated, I have found that by increasing the angle of inclination at which the table supporting the blank is held relatively to the line of the punch, the pivotally
80 yielding movement of the punch is not required and the punch or gang may be rigidly held in the end of the tool support and descend positively in a straight line upon the
85 blank. The approximate inclination is shown in Figs. 2 and 8. This change in the inclination and in the method of raising the tooth necessitates a change in the punch, as the
90 action is that of a direct punch instead of a combined punch and lift as heretofore and enables me to use a punch of simple form. This is shown in Fig. 8 and in gang form in
95 Figs. 6 and 7. The rear line of the punch is centrally of the body and the side walls extend at right angles to each other toward the front, the shape of the punch in section being approximately square or diamond shaped.
100 The lower end is cut on a slant the lowest point being directly at the center of the extremity of the rear central line and the slant is upward from this line to the front. In
105 Figs. 6 and 7 I show two forms of gang punches. While a series of single punches may be used together, they are so small and require to be so accurately adjusted in relation to each other, that I find a great advantage
110 in making the gang in one piece, as they can thus be handled as a single punch and sharpened as a single punch requiring no independent adjustment. The lower part or rear of the punch is the same, whether the
115 punch be single, or in a gang or be made out of a single piece or fixed to a single piece. In both, the lower and rear side of the punch is formed with the sloping or inclined walls
120 meeting at a central edge, which forms with the slant or bevel at the end, a sharp point.

In Fig. 6 the rear working face is shown at *a'* formed with a strengthening piece *b'* serving also as the holding shank, the end being
125 cut on a slant from the rear upwardly to the front, leaving a series of projecting punch points *c'*. Or the blank *b'* may be made with the projections *a'* on each face as in Fig. 7. The inclined table 4 supports a holder 5 for the blank, and this holder is moved downwardly step by step equal to the distance
130 between the rows of teeth by means of a feed movement, consisting of the screw 6 turned by pawl and ratchet mechanism 7 operated from the source of power and this screw is engaged by a threaded lever 8 connected to the holder 5. The holder is moved downward

against the pressure of a spring or weight 9 connected to the holder which returns the holder to normal position when the lever 8 is disengaged from the screw 6.

5 The teeth are made in the blank with alternate lateral rows in alignment and I provide for the shifting of the blank to effect this. The blank 10 is secured to a channeled plate 11 which in turn is held within a second channeled plate 12 which is within the holder proper. The holder has one side open and this is closed by a projection 13 from the table, which projection is recessed on its inner face and in this recess is inserted a plate 14 having a toothed or serrated face. The plate 15 12 is kept pressed against the projecting wall 13 of the table by springs 15 between it and the wall 16 of the table. The right hand side of the plate 12 has projecting V shaped pieces 20 17 fitting the like serrations in the inserted piece and the action of the feed movement forcing the holder downward step by step, this movement being equal to one half the distance between the apexes of the teeth on the inserted piece, moves the V shaped pieces 2 17 over the teeth of the inserted piece which shifts the plate 12 and the blank carried thereby to the left and the apex of the piece 17 bears on the apex of one of the teeth of 30 the inserted piece. A punching operation immediately follows while the blank is thus held and as soon as the punch is withdrawn the feed operates and the springs force the V shaped pieces down into the notch after 35 which another punching operation follows and so on, the table 12 being thus shifted back and forth after each feed of the table so that the teeth punched alternate in position. In order to vary the amount of this 40 shifting movement the inserted piece may be made removable and interchangeable pieces provided with finer or coarser teeth or serrations. A handle 18 is provided to throw back the plate 12 when it is desired to change the 45 inserted piece.

While I have shown the table inclined and the punch arranged vertically the table may be horizontal and the punch inclined without departing from the spirit of my invention. 50 This would still maintain the relative positions of punch and blank as shown in Fig. 8. This figure also illustrates the arrangement and movement of the punch or gang of punches as above explained. The punch, or 55 gang of punches, moves always in a right line and maintains the same angle throughout its movement in relation to the blank. The bottom of the cavity from which the metal is taken to form a tooth, is shaped by the rear 60 or under side of the punch; while the bevel forms the face of the tooth and bears against the metal, maintaining always the same relation to the metal, as it pushes it back. The edge underneath with its sloping sides 65 forms a corresponding groove V-shaped in cross-section, this being the tooth cavity. The metal is lifted up out of this cavity, sim-

ply by the wedging action of the bevel face of the punch and by its direct movement. Thus a definite and certain plain face of a 70 tooth is formed, invariably uniform and without any possible curl or turned edge.

When a single punch is used, it will be understood that it is to be used in a machine, such as heretofore known, and in use, in 75 which the punch is shifted laterally step by step to form a lateral row of teeth.

When the gang is used, it is used in a machine such as that above described, in which the gang is shifted laterally after forming 80 one row, in order to form the other with its teeth opposite the spaces between the teeth of the first row.

I claim as my invention—

1. In combination with the bed of a rasp 85 punching machine, a punch holder arranged to reciprocate at an angle to said bed, and a punch rigidly fixed in said holder, thereby reciprocating in a direct line and at a certain angle to the bed, the said punch being formed 90 with plain inclined faces on its under side, meeting in a central point forming edge, arranged to form the bottom of the tooth cavity, and with a beveled end sloping from the point below, and arranged to push up the 95 metal and form the face of the tooth, substantially as described.

2. In combination with the bed of a rasp punching machine, a punch holder arranged to reciprocate at an angle to said bed, a gang 100 punch each punch of the gang being formed with plain inclined faces on its under side, meeting in a central point forming edge and arranged to form the bottom of the tooth cavity and all having beveled ends sloping at 105 about the same angle, from the points below, and arranged to form the face of the teeth, said gang being set in the holder to reciprocate in a direct line in relation to the bed, and mechanism for changing laterally the 110 relative position of the punch gang and the bed, substantially as described.

3. In combination, with the vertically movable frame B, means for applying pressure thereto, a tool carried by a barrel C, receiving 115 movement from said frame B, and a spring between said barrel and frame, substantially as described.

4. In combination, with the vertically movable frame B, means for applying pressure 120 thereto, a barrel C, a tool carried thereby, a spring between said barrel and frame and means for adjusting the spring, substantially as described.

5. In combination with a tool, the frame, 125 means for applying downward pressure to said frame, a spring between said tool and frame and springs between the hammer frame and main frame for lifting said hammer frame after its downward movement, 130 substantially as described.

6. In combination with a punch and mechanism for operating it, a stationary table for supporting the blank, a longitudinally mov-

able holder between the blank and table, the blank being movably supported within the holder, and means for shifting the blank laterally within the holder, substantially as described.

5 7. In combination with a gang punch and mechanism for operating it, a table, a longitudinally movable holder, and a laterally movable plate 12 supporting the blank, and means

for shifting the plate 12, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN H. STOKES.

Witnesses:

WM. McDERMOTT,
JOSEPH McDERMOTT.