FRANK W. WARDWELL, JR., OF CLEVELAND, OHIO.

COMBINED SETTING AND FILING MACHINE.

1,289,329.


To all whom it may concern:

Be it known that I, FRANK W. WARDWELL, Jr., a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Combined Setting and Filing Machines, all substantially as shown and described, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a side elevation of the machine on a considerably reduced scale, and Fig. 2 is a plan view of Fig. 1, the complete machine being shown in both views.

Fig. 3, Sheet 2, is enlarged as compared with Figs. 1 and 2 and is a front elevation of the machine looking in from the right of Fig. 1, and Fig. 4 is a vertical sectional elevation of the machine corresponding in the position of the parts to Fig. 3, but with the immediate front portions of the mechanism removed to disclose parts otherwise hidden from view and showing the relations of the setting and filing and feed mechanism.

Fig. 5, Sheet 3, is a horizontally sectioned plan view of the machine taken on a line above the main shaft. Fig. 6 is a vertical sectional elevation of the machine, illustrating the operating portion of the setting mechanism and taken on the line corresponding substantially with Fig. 3. Fig. 7 is a cross section on line 7—7, Fig. 1.

Fig. 8, Sheet 5, is a sectional elevation through the saw-clamping and setting mechanism. Fig. 9 is a sectional elevation on a line corresponding to 9—9, Fig. 6. Fig. 10 is a perspective view of one of the saw clamps associated with the setting mechanism, and Fig. 11 is a sectional view looking down on line 11—11, Fig. 8, and through the head of the clamp in Fig. 10. Fig. 12 is a plan view of the feed paws and a part of a file engaging a saw.

The operating parts as thus shown are mounted directly or indirectly upon the main frame a, which may be of one or more parts rigidly built together, and power is derived through a drive shaft b, mounted in said frame relatively as seen in Fig. 7, and carrying fast and loose pulley wheels w and w', or their equivalent, for the application of power from any available source, but hand power may be used through the outer pulley wheel having removable handle h', as seen as in Fig. 3. The rate of operation is as high as seventy teeth a minute, more or less.

The saw s, which this machine is especially adapted to handle is of the band type for use in wood or metal working and these saws usually are from one-eighth of an inch to two inches in width and have from two to eighteen teeth to the inch, according to the work to be done therewith, and endless. Obviously, different sizes of files are required for different styles of saws and adjustments must be made in the saw clamping devices for setting and filing as will be seen further along.

In the setting of the saw which precedes the filing of a given tooth I employ two clamps c and c', which are supported in or upon a casting or head h rigid with the main frame and which has a central slot in its top and front of say two to four inches deep to accommodate the saw and which extends the full length of the casting to and including the filing point, as partially seen in Figs. 3 and 4. The said slot takes the saw somewhat loosely and hence the need of the clamps c and c' to hold the saw for setting by either of the setting members 3 and 4, respectively. Fig. 8 shows such engagement by the member 4.

The clamp c' is permanently fixed on the top of the casting h with its lip across the slot therein, while the clamp or clamping member c is constructed substantially as seen in Fig. 10, having a head with a square engaging face provided with a central recess beneath its top engaging edge and a stem or standard adjustably clamped against part h by the clamping screws 6 and 6'. The said screws and particularly screw 6 serve to engage the clamp c firmly against the saw with clamp c' as a bearing on the opposite side, and at the same time where the saw may vary in gage or thickness the thin shank of clamp C acts as a spring, bends in its middle and allows the thin part of saw to pass through between c' and c without binding or strain. The saw is supported and adapted to slide along on the adjustable support beneath, consisting, in this instance of the follower 7' and the screw 7 beneath the same and engaged through a corresponding bore in said casting or head for said parts.
The support is centrally disposed between the clamps \( c \) and \( c' \) and can be raised or lowered according to the width of the saw. The said clamps have comparatively wide engaging portions bearing against the saw immediately at the base of the tooth to be set and at either side thereof so as to give firmness to the engagement while the saw is free to be fed along in its slot under positive feed mechanism. This operation involves intermittent feeding of the saw through the machine, and the pause in any case is for only a moment of time and during which one tooth is set and another is filed.

The support for the saw at the place of filing consists of a tilting bar \( m \) having ears at its outer exposed end between which the saw rests and is adapted to slide, and the said bar is located between the casting \( h \) and the clamp \( d \) and pivotally engaged at about its middle on the end of an adjusting screw \( n \). It is desirable to have the saw at the filing point relatively higher than at the setting point and said bearing bar \( m \) is designed to contribute to this effect as much as possible through the action of screw \( n \) and tilting of bar \( m \). Otherwise the saw is engaged by the outside clamping or engaging member \( d \) and the wall of casting \( h \) on the inside and which parts extend above the bar \( m \) and engage the saw about as do the clamps \( c \) and \( c' \). The clamping plate \( d \) is hinged on a pin or pintle \( p \) at its bottom, Fig. 3, and which can be withdrawn to remove the clamp bodily to clean out the chips and dirt, while the inner clamping wall or portion \( h \) is a fixed portion of the machine. A screw \( k \) has a spring \( k' \) in tension relation thereof and a tooth \( k'' \), Fig. 4, to tighten plate \( d \) to prevent chattering and provide the requisite firmness to permit filing.

The two setting jaws 3 and 4 comprise slotted plates adjustably secured by screws 18 at the upper ends of the bifurcated rocking member \( g \) which is mounted for longitudinal adjustment upon a sleeve 17 having rotatable bearing on the headed shaft or pin 16 screwed rigidly within the end of casting \( h \), see Fig. 4. Set screws 19 are also carried by the arms of rocking member 17 in bearing engagement with the end edges of the plate-like jaws 3 and 4 to fix said jaws at any desired angle with the saw teeth. A set screw 17' serves to fasten the rocking member in adjusted position on sleeve 17. The immediate tooth engaging portion of each setting member 3 and 4 is beveled vertically, see Fig. 6, to about the inclination or set the tooth is to receive, and also beveled transversely, see Fig. 5, so that the cutting face of the tooth is set more than the back, in other words the tooth is given a slight twist, and first one setting member operates and then the other under the limited rocking motion imparted to the member \( g \) through the arm 20 thereof and the open slot therein working over or upon the eccentric 21 on short shaft 23 in a stud on the main frame. Said short shaft carries a gear 24 engaged and driven by a pinion 25 on main shaft \( b \). A timed movement is thus imparted to the said rocking member and the setting devices mounted thereon, and the adjusting screws 18 and 19 determine the degree or amount of set to be given to the saw teeth.

The feed or movement of the saw as setting and filing occurs is controlled by means of two paws 8 and 8', respectively. These paws work together under a common action and are in duplicate for the reason that sometimes a saw tooth is broken out, leaving a void, and in such case a single paw which has only a single tooth movement at a time cannot reach across the void space to engage the next succeeding tooth and therefore the feed of the saw stops. Hence I have adopted two co-acting paws which engage the saw at given spaces apart. Fig. 4, 80 say two or more teeth, and if one fails the other will act and the feed of the saw will proceed in the regular way. Pawl 8 is adjustable as to length, being fastened by screws \( e \) extending through slots, and pawl 8' can be lengthened or shortened by releasing screw \( f \), thus permitting adjustment of both paws to differently spaced teeth on the saws.

Both paws are supported on an oscillating or vibrating hanger 9 pivoted at 10 on a substantially triangular member 12 pivoted at 13 on the main frame and adapted to rock or vibrate at regular intervals on said pivot within controlled limits and to force feed the saw by means of said paws, tooth by tooth, uniform distances successively. In point of time the said paws act when the file is on its return stroke and the saw sets are retired, and hanger 9 is pivoted at 10 for the essential purpose of advancing the feed paws 8' and 8 so as to bring the face of the tooth in correct position for the file to cut the same more or less, and accuracy of feed is obtained by pawl 8 which actually engages a tooth already cut or filed. The means for actuating the said paws and also the file comprise a skeleton frame 30 overlying the front fixed flat portion 31 of the main frame and adapted to be raised and lowered in respect thereto within limits by a cam 32 on the end of drive shaft \( b \), Fig. 7, working in a corresponding opening in said frame. The said frame 30 is confined in working relations in respect to wall 31 and said shaft by lugs or projections 29 on the back thereof extending inward through openings in wall 31 and slidably engaged on heavy inclined stationary rods 33 fixed in the said wall and having their lower ends 34.
projecting through a bore in the wall into correspondingly inclined bores in said main frame. A spring 34 is interposed on each rod 33 between the lug 29 and a short arm 29' on the inner side of wall 31, and normally the said wall and plate are spaced apart as shown in Figs. 5 and 7. The said spring cooperates with cam 32 in depressing said plate after it has been raised to do its work, and the said rods are set at such an angle as to raise the filing arm 40 at a slant when leaving the back of the tooth, as will presently be seen. This movement also is designed to permit of entering and leaving a tooth with an extreme hook.

A plate 35, Figs. 1 and 7, is confined within beveled keepers or guides 36 fixed on frame 30 top and bottom and is independently slidable therein within said guides, and said plate has a vertical slot 37, engaged by a steel roller 38 on a crank arm 38' integral with cam 32 and having such throw as is required to give the required stroke. A set return movement to the file supporting arm 40. The said arm is rigid with said plate and has a socket head 41 for the file on its outer end, while the inner end of the file is engaged in a somewhat similar or suitable socket 42, the said sockets being adjustable in their respective supports in arm 40 to obtain the required horizontal position of the file.

In operation the frame 30 on cam 32 and the sliding plate 35 and crank roller 38 cooperate with arm 40 in thrusting the file forward to sharpen a tooth and then to return the file to starting position while it is raised from the saw, the lift being through frame 30 and cam 32 and the thrust and return through crank 38 and plate 35.

Now, as to the pawls 8 and 8', it will be seen that the triangular vibratory member 12 through which said pawls are actuated is engaged at or through a hook or open slot 46 in one angle thereof by a screw 44, or its equivalent, fixed in said frame 30 through said hook or slot, while said member 12 is pivoted at 13 on the main frame. It follows when frame 30 is bodily raised by its cam 32 that the member 12 through screw 44 will be caused to swing on its pivot a sufficient distance to cause the said pawls to move forward the distance of one tooth in the saw, and of course the thrust is proportioned to the space between teeth by adjustments in the actuating parts, and pawl actuation is timed to occur in the intervals when the file and the saw sets are disengaged. A spring 45 co-operates with hook 46 serves to keep it down in working relations over the head screw or pin 44, while the hanger 9 is adjustable as to the vibratory part 13 by set screw 14, and a second set screw 14' in a lug in frame a engages the back edge of part 12 and forms an adjustable stop therefor. A coiled spring 15 holds pawl 8 to its work, and a separate spring 15' also holds pawl 8' down in engagement with the saw. Pawl 8' is adjustably secured in a short arm or holder F pivotally supported on the lower end of hanger 9.

The tooth setting member 6 rocks with the sleeve 17 but can be moved either to the right or left so as to always bring the setter jaws 6 and 4 opposite a tooth in any given saw, and this is important where the machine is designed to set and file different kinds of saws having teeth of different sizes and lengths. In other words, when the file rests in or on a tooth as in Fig. 4, the setting device is adjusted so as to bring the setter jaws opposite or in line with a tooth which is to be filed subsequently and it is then looked for use. Each setter jaw is adjusted so that it twists the tooth to give the proper clearance behind the cutting edge, and only about two-thirds of the upper or pointed portion of the tooth is set.

In operation, two adjustments cover the movement of the pawl actuating lever attached to the main frame and rocked by a screw attachment to the vertical slide frame, Fig. 3. One of these adjustments covers the length of the stroke, the other the amount of cut removed from the face of the tooth. One elevating screw 7 raises the teeth in the vise to the proper level for setting and the other screw 8 to the proper level for filing. Two pressure screws tighten the vises which hold the saw, one screw A where the teeth are filed and the other screw B where the teeth are set.

After the machine is started it acts automatically throughout and requires no personal attention in its setting, filing and feeding mechanisms, while the said mechanisms can be adjusted to saws of different widths and to teeth of various shapes and sizes and variously spaced apart to perform simultaneous setting and filing operations, making these adjustable mechanisms mutually independent and hence inseparable. Thus referring to the double feed pawl action, this double movement of feed pawls is so arranged that one feed pawl or dog works on each side of the file. The pawls being adjustable as to length can be spaced so that they come three, four or five teeth apart, or any number of teeth for that matter, according to the size and spacing of same. Suppose these pawls are placed exactly five teeth apart, that is the pawl on the left side of the file never comes nearer the file than the width of three teeth and the pawl on the right side of the file never nearer the file than two teeth; these pawls are then locked so that they are spaced just the width of five teeth apart. The movement of these pawls is then adjusted so that they move along the saw just the length of one true tooth.

The saw now starts to pass through the
machine as the machine operates, and each time the two pawls move back or toward the right just the length of one tooth (a tooth that is true in width and length or in other words is evenly spaced) the following action takes place. With a long tooth, one longer or wider at its root or base than the rest, the pawl on the right of the file fails to fall into the gutter of this tooth and push it along, but the pawl on the left of the file is working against a resharpned true tooth and this tooth is pushed along its exact length, with the result that the feeding of the feed pawl against the long tooth is temporarily thrown out of action while the pawl to the left of the file works and moves the saw along the exact distance or width of a true tooth, so that when this long tooth reaches the file it is properly evened up or spaced and so becomes the same width as all other teeth. The reverse of this action takes place when a short tooth approaches the file to be cut. The result is that the pawl on the left side of the file, when it works on perfectly spaced and resharpned teeth is always pushing against the face of an evenly spaced tooth, so that the saw teeth are all produced the exact same length.

What I claim is:

1. In a combined saw setting and filing machine, mechanism to set the saw teeth and mechanism to file the same teeth, yielding clamping devices to hold the saw at each of said mechanisms, a vertically-adjustable support beneath the saw at the setting mechanism, a vertically-adjustable tilting support beneath the saw at the filing mechanism, and means to feed the saw over both said supports.

2. In a combined saw setting and filing machine, mechanism to set the saw teeth and mechanism to file each tooth when set, said mechanisms being adjustably-related longitudinally of the saw to permit simultaneous setting and filing operations on saw teeth of varying length, independent feed pawls engaged with the saw teeth forwardly and rearwardly of the filing point, and co-operating devices to operate said setting and filing mechanisms and said feed pawls alternately.

3. In a combined saw setting and filing machine, setting and filing mechanism for the saw, and means to advance the saw to be set and filed simultaneously comprising a plurality of pawls adapted to engage the saw teeth in a step-by-step movement with a plurality of teeth between the pawls, a vertically-slidable part and a vibratory part operatively engaged thereby and having positive operating engagement with said pawls.

4. In a combined saw setting and filing machine, feed means for the saw comprising an oscillatory member and an adjustable stop therefor, a pawl to engage the saw teeth pivoted on said member, an adjusting screw for said pawl, and a second pawl to engage the saw teeth pivotally and adjustably mounted on said first mentioned pawl.

5. In a combined saw setting and filing machine, an oscillatory member having a tooth-engaging pawl adjustably secured thereon and a holder pivoted on said pawl having a tooth-engaging pawl adjustably mounted therein, said pawls being adapted to engage separate teeth on the saw.

6. In a combined saw setting and filing machine, a holding device for the saw comprising a stationary support having a saw clamping member provided with a spring shank and fastening screws, a pivoted clamping plate having a tension spring and screw, and separate vertically-adjustable rests for the saw adjacent said clamping member and plate.

7. In a combined saw setting and filing machine, a saw guide and holder comprising a stationary support having a pivoted clamping plate for the saw and spring tension clamping means engaged with said plate, and a tilting rest and adjusting set screw to support the saw for sliding movement between said stationary support and the clamping plate.

8. In a combined saw setting and filing machine, a pair of tooth setting members, and a clamping holder for the saw intermediate said members having a spring shank and a recessed face adapted to engage the saw tooth linearly thereof and at each side of the tooth at the base thereof.

9. In a combined saw setting and filing machine, means to set the saw teeth and means to file the same teeth, a main and an auxiliary feed-pawl engaged with the saw teeth, at either side of the filing point of the saw, and co-operating mechanisms to operate the said means and the said pawls alternately, the main pawl being in advance of the auxiliary pawl and engaged with teeth that have been filed.

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

FRANK W. WARDWELL, Jr.

Witnesses:
JAMES A. FORD,
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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D.C."