Aug. 17, 1943. C. SILVER 2,327,223

SHEET TRIMMER

Filed April 8, 1943 2 Sheets-Sheet 1

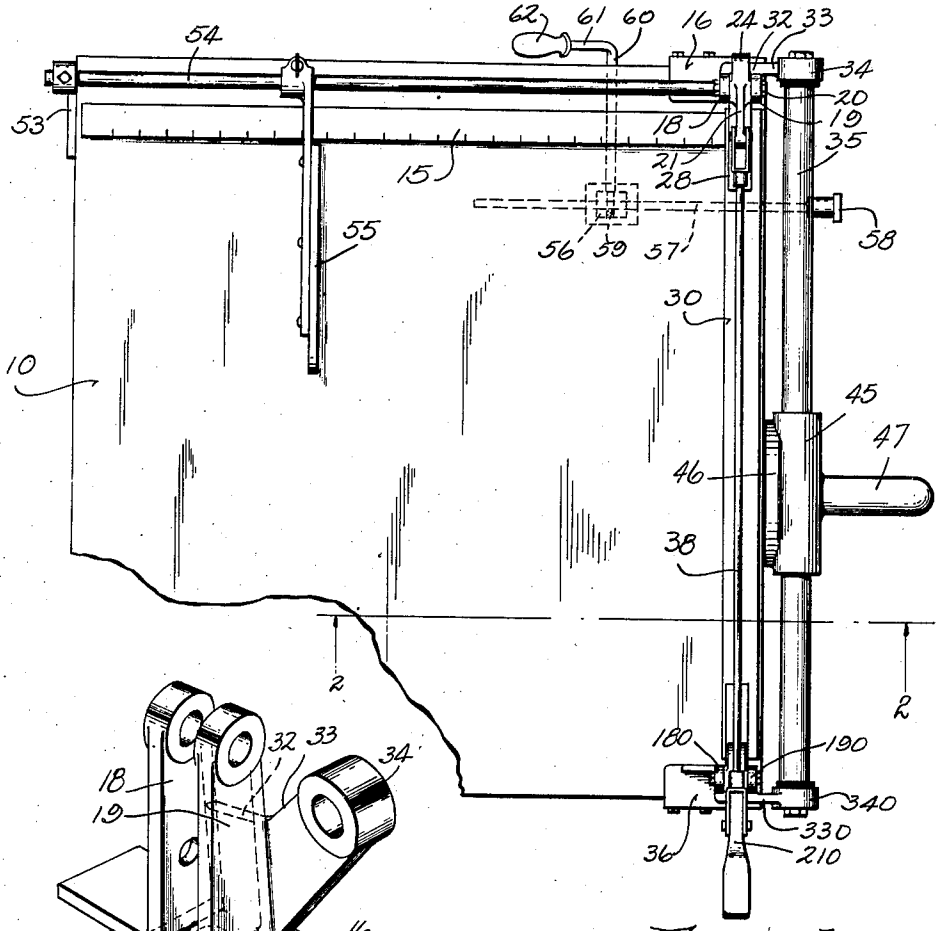


Fig. 1.

Fig. 9.

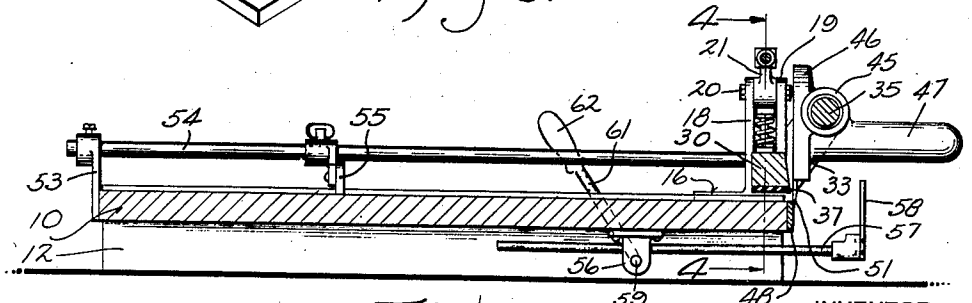


Fig. 2.

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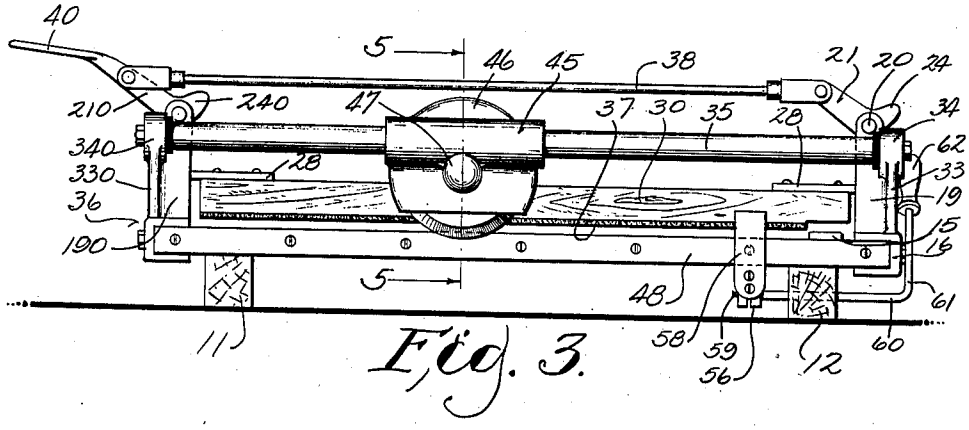


Fig. 3.

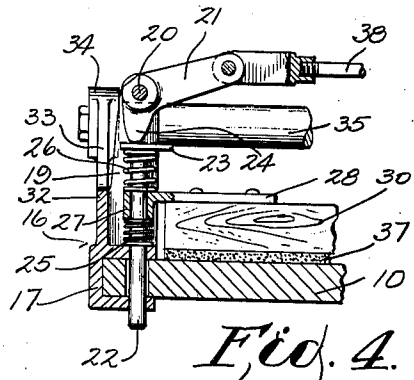


Fig. 4.

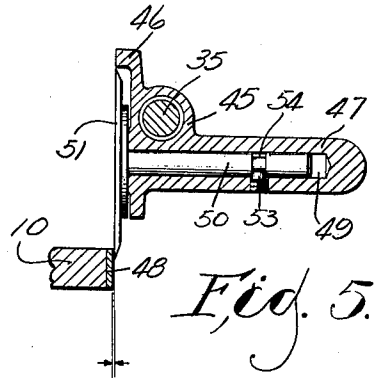


Fig. 5.

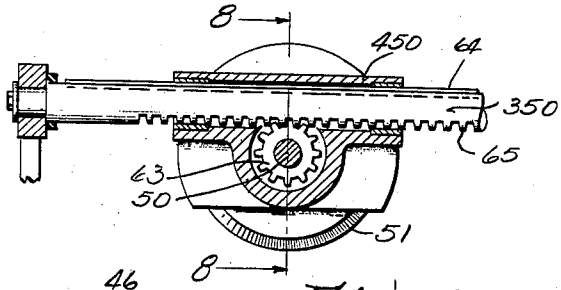


Fig. 7.

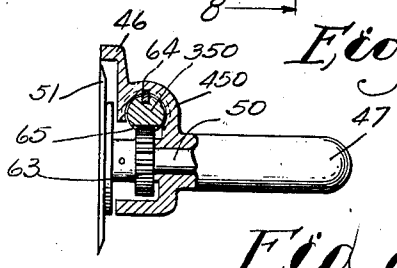


Fig. 8.

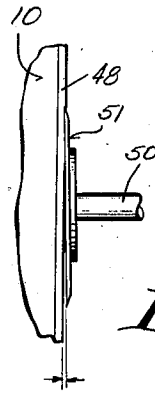


Fig. 6.

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UNITED STATES PATENT OFFICE

2,327,223

SHEET TRIMMER

Charles Silver, deceased, late of Wauwatosa, Wis., by Leah Silver, administratrix, Wauwatosa, Wis., assignor to Herbert F. Johnson and Ray Ochs, Milwaukee, Wis.

Application April 8, 1943, Serial No. 482,248

18 Claims. (Cl. 164—77)

This invention relates to improvements in a sheet trimmer.

The object is to provide specific improvements in the work positioning and clamping means and the cutting blades to assure smoothness and uniformity of operation, the accurate positioning and holding of the work, simplicity of construction and a very low cost as compared with ruggedness of construction.

The improvements are, for the most part, rather specific, and incorporate details of construction which will be more apparent from the following disclosure of the invention.

In the drawings:

Fig. 1 is a plan view showing a trimming board embodying the invention.

Fig. 2 is a view taken in cross section on the line 2—2 of Fig. 1.

Fig. 3 is a side elevation of the device shown in Fig. 1.

Fig. 4 is a fragmentary detail taken in section on line 4—4 of Fig. 2.

Fig. 5 is a fragmentary detail taken in section on the line 5—5 of Fig. 3.

Fig. 6 is a detail view in plan of the parts shown in Fig. 5.

Fig. 7 and Fig. 8 are fragmentary details showing a modified cutter arrangement partially in section and partially in elevation, the viewpoints from which the two views are taken being at right angles to each other.

Fig. 9 is an enlarged detail view in perspective showing one of the bracket fittings.

Like parts are identified by the same reference characters throughout the several views.

The board or platen 10 is supported at front and rear by transversely extending legs 11 and 12 respectively. In accordance with conventional practice a gauge strip 15 extends across the rear of the board and may be calibrated in inches or otherwise.

At the rear right hand corner of the board 10 is a bracket fitting 16 which comprises a channeled base 17 engaged over the end of the board 10 and supporting various upwardly extending arms. A detail of the assembly on an enlarged scale appears in Fig. 9, and the fitting is illustrated in plan and in front elevation in Figs. 1 and 2 respectively, and in section in Fig. 4.

The parallel arms 18 and 19 carry the fulcrum bolt 20 for cam lever 21. Between the arms a plunger 22 is vertically reciprocable, being guided in bearings in the upper and lower flanges of the channeled base 17 of the fitting. A cam follower head 23 at the upper end of plunger 22 is engaged by the cam 24 at the end of lever 21. The plunger is supported in opposition to the thrust of cam 24 by a pair of compression springs 25 and 26 between which a sleeve 27 floats on the plunger, the sleeve having an arm 28 to which one end of the clamping bar 30 is connected. When the lever 21 is oscillated counter-clockwise from the position in which it is illustrated in Fig. 4, the cam pressure on follower 23 is released, whereupon spring 25 lifts the sleeve 27 and the clamping bar 30, motion being communicated from the sleeve through spring 26 to the cam follower 23 to lift the plunger.

When the cam lever is operated clockwise toward the position shown in Fig. 4, the action of the cam 24 upon the follower 23 first compresses spring 25, which is relatively lighter than spring 26, so that the clamping bar 30 is thrust into engagement with the work mounted on the board or platen 10. Regardless of the thickness of the work there will be some movement of the plunger 22 after the work is engaged. This movement is accommodated by the compression of spring 26 to permit of sufficient lost motion so that the pressure on the work is greatly increased before the cam 24 reaches the position shown in Fig. 4.

The space between the arms 18 and 19 is partially enclosed, and the arms themselves are greatly reinforced by another arm 32 which extends transversely across arms 18 and 19 and thence upwardly as indicated at 33 to carry the socketed head 34 in which the rear end of shaft 35 is mounted. This piece of shafting is of substantial strength and provides a guide and support for the cutting wheel hereinafter to be described.

A bracket fitting 36 at the front of board 10 is similar to bracket fitting 16. The fittings 36 and 16 are correspondingly constructed but are reversed for right and left hand application at the opposite ends of the board. Fitting 36 has arms 180 and 190 supporting a fulcrum for the lever 210. Extending across the front sides of arms 180 and 190 and thence upwardly, is a bracket arm 330 for the head 340 which supports the front end of the guide shaft 35.

The front end of the clamp bar 30 is mounted on a finger identical to that shown in Fig. 4 and hence requiring no description. Not only the plunger but the supporting springs 25 and 26 and the sleeve 27 and arm 28 in the front assembly, are identical with those at the rear. The clamping bar is very slightly—almost imperceptibly—bowed downwardly at its center. Its lower margin carries a yieldable clamping strip 37 which

may be made of felt but, as illustrated, is preferably made of sponge rubber or artificial rubber.

The levers 210 and 21 are connected by a link 38 for simultaneous operation, and one of the levers is provided with a handle at 40. Consequently the front and rear ends of the clamping bar will move up and down concurrently with great accuracy.

Slidable upon the shaft 35 is a sleeve 45 integrally providing an arcuate knife guard 46 and a handle 47 which projects laterally from the sleeve. The side margin of board 10 is finished throughout the length of the board with a stationary cutting knife 48. A long bearing bore 49 extending into the handle 47 carries a shaft 50 upon which is a knife disk 51 coacting as a shear with the stationary knife 48 on the edge of the board. A positioning pin 53 secured into the handle 47 engages an annular groove 54 in the shaft 50 to maintain the shaft in its bearing.

The shaft 50 is not at right angles to the face of knife 48 either in the vertical plane nor in the horizontal plane, as clearly appears in Fig. 5 and Fig. 6. While the angularity of the knife 51 to the stationary shear strip 48 is exaggerated in the drawings, it is a fact that in the preferred embodiment of the invention the disk 51 engages the shear strip 48 when the shaft 50 is very slightly inclined to the horizontal as suggested in Fig. 5, and is also inclined with reference to a line normal to the shear strip 48 in the horizontal plane as shown in Fig. 6. This disposition of the shaft and the cutting disk 51 borne thereby assures an optimum cutting relation between the disk and the stationary shear strip 48. The sleeve 45 in which the shaft 50 and disk 51 are carried move very freely along the guide shaft 35. The assembly is also tiltable upon the guide shaft so that, under the weight of the handle 47 and any weight imposed thereon by the operator, the shear disk 51 will be maintained constantly in pressure engagement at a point along the edge of the stationary shear strip 48.

At the rear left corner of the board 10 a bracket 53 supports one end of a rod 54 upon which the gauge member 55 is adjustable transversely of the board. The other end of the guide rod 54 is carried in an opening in bracket arm 18.

Another bracket 56 is secured to the lower surface of the board forwardly of its rear leg 12. This bracket comprises a pair of clamp ears between which is adjustably slidable a rod 57 carrying a gauge member 58. The clamping ears or brackets 56 are clampingly engaged with or free from the rod 57 by means of a screw 59 which has an extension shaft 60 extending rearwardly through the leg 12 and thence at right angles upwardly at 61 and provided with a handle 62. The gauges 55 and 58 may be used either concurrently or alternately according to the nature of the work and the manner in which it is to be introduced and removed.

After the gauge or gauges 55, 58 are set, the work is laid upon the board 10. The work may comprise either a single sheet or a number of sheets. The edge to be trimmed will project across the stationary knife 48. Thereupon the hand lever 40 is manipulated to oscillate the cam levers 21 and 210 to force the ends of the clamping bar 30 toward the work. Due to the slight downward convexity of the bar the center of the bar will first contact the work and thereafter the work will be engaged by the ends of the bar. Despite the thickness of the bar 30 it is capable of sufficient flexion to bring its ends into engagement with the work even when the cushion 37 is not used. Where the cushion 37 is used it will ordinarily be more highly compressed at its center than at its ends due to the slight downward convexity of the bar as previously described. In any event, this arrangement assures that the work will be firmly grasped at its center as well as its ends and, in fact, throughout the length of the work. Regardless of whether the work is thick or thin, there is sufficient lost motion between the cam followers 23 and the sleeves 27 to accommodate any difference in thickness within the cutting range of the apparatus.

Ordinarily the handle 47 on the shear knife assembly will have been pulled to the extreme front of the board before introducing the work. Thereupon, the work being positioned and clamped, the operator slidably pushes forwardly on the handle 47 to move the clamp disk rearwardly upon guide shaft 35. Due to friction the cutting disk will rotate in engagement with the stationary shear strip 48, thereby facilitating the shearing edge. However, even if the disk were non-rotatable, it still would cut. One advantage in making the disk rotatable is to effect a constant resharpening of the disk and to present a constantly new cutting edge to the work.

If more rapid rotation is desired than that which would normally occur due to friction, the organization shown in Figs. 7 and 8 is one of several possible means for increasing the relative rate of rotation of the cutting disk. In this device the sleeve 450 provides a chamber in which a pinion 63 is mounted on the shaft 50 which carries the disk 51. In this construction the sleeve 450 may have a key 64 operating in a keyway cut longitudinally in the upper surface of the guide shaft 350. In the lower surface of the guide shaft 350 there may be provided teeth at 65 meshing with the pinion 63 so that as the assembly is moved around the shaft the engagement of the rack teeth 65 with pinion 63 will effect a rotation of the cutting disk 51. Since the engagement of the pinion teeth with the rack occurs at a much smaller radius from the axis of shaft 50 than the radius at which frictional engagement of the disk 51 with the stationary knife strip 48 occurs, the result will be a very substantial increase in relative rate of disk rotation.

Various other modifications can be made within the contemplation of this invention.

In practice the shearing mechanism herein disclosed gives a very clean cut, regardless of how thick or thin the work sheets may be. Even if the work sheets are very thin they do not get free of the clamping bar near the center, but are tightly held at all points. One of the features which contributes to the accuracy of the trimming operation is the great rigidity of the parts. This rigidity is obtained simply by the weight of the guide shaft 35 and the rigid, yet inexpensive, construction of the brackets 16 and 36. Another feature contributing to the accuracy of trim is the angularity of the disk and its supporting shaft both horizontally and vertically with reference to a line at right angles to the surface of the stationary shear strip 48.

What is claimed is:

1. A trimmer comprising the combination with a board, of a clamping bar having a slight down-

ward convexity between its ends and normally positioned in spaced relation to the board, and means for simultaneously moving the ends of the bar substantially vertically downwardly into clamping engagement with work resting upon the board, said bar having a work engageable portion sufficiently yieldable so that after first contacting the work near the center of the bar the bar will progressively contact the work toward the ends of the bars.

2. The combination of claim 1 in which the yieldable portion of the bar comprises a compressible facing for the bar.

3. A trimmer comprising the combination with a board, of a clamping bar coacting with the board to engage work resting on the board, guide plungers for the ends of the bar, bearings in which the guide plungers are vertically reciprocable, sleeves independently movable on the plungers and connected with the ends of the bar, spring means supporting the sleeves, spring means interposed between the sleeves and the plungers, and interconnected means for acting simultaneously upon the respective plungers in a downward direction toward the board, whereby to compress the spring means first mentioned until the bar engages the work and thereafter to compress the second mentioned spring means.

4. The device of claim 3 in which the bar has a relatively yieldable and initially downwardly convex work engaging means between said sleeves.

5. In a trimmer, the combination with a board, of bracket fittings at the front and rear ends of the board, arms carried by said fittings and extending upwardly above the board in pairs, levers pivoted between the respective arms and provided with cams, plungers reciprocably guided in the respective fittings for vertical movement between said arms and provided with cam followers at their upper ends, compression springs in series upon the respective plungers, sleeves reciprocable upon the plungers and interposed between the respective springs thereon, and a clamping bar having its ends connected with the respective sleeves and extending between said sleeves across said board.

6. The device of claim 5 in which one of said levers is provided with a handle, and a link connects said levers for concurrent movement.

7. The device of claim 5 in which a cutting knife is movable along said board in general parallelism to said bar and said bracket fittings are each provided with a third arm and a shaft is supported in said arms for the support and guidance of said cutting knife, said cutting knife having a carrier member slidable upon the shaft.

8. In a trimmer applicable to a trimming board, the combination with a base comprising a channel in which a margin of the board is receivable, said channel having upper and lower board engaging flanges provided with registering bearing apertures, and a pair of arms extending upwardly from the base at either side of the aperture in the upper flange.

9. The bracket fitting described in claim 8, together with a third arm extending across and connected to the arms first mentioned and projecting laterally and upwardly and provided with a socketed member.

10. A trimmer comprising the combination with an apertured board, of a bracket fitting comprising a channeled base applied to a margin of the board and having upper and lower flanges engaged with the upper and lower faces of the board and provided with bearing openings registering with the aperture of the board, a plunger reciprocable through said openings and extending through the board aperture, a pair of compression springs encircling the plunger, one of which rests upon the upper flange of the said base, a cam follower at the upper end of the plunger engaged by the other spring, a sleeve reciprocable upon said plunger and interposed between said springs, a pivot pintle spanning the space between said arms above said plunger, and a lever pivoted on the pintle and having a cam portion engageable with the cam follower at the upper end of the plunger for depressing the plunger against the compression of said springs, said sleeve being provided with means for supporting at least one end of a clamping bar.

11. The structure defined by claim 10 in combination with a third arm connected with said base and extending transversely across the space between said arms and connected to both of said arms, said third arm extending laterally and upwardly and provided with a socketed head.

12. A trimmer comprising the combination with a trimming board having a shear strip extending along one margin, of a shear knife movable along said strip in shearing coaction therewith, a guide along which said shear knife is reciprocable, and supporting means reciprocable upon the guide and upon which said shear knife is mounted, said shear knife being angularly disposed with respect to a line normal to said strip.

13. The structure defined in claim 12, wherein the cutting knife is angularly disposed both in a horizontal plane and a vertical plane with respect to the aforesaid line normal to the cutting strip on the board.

14. In a trimmer, the combination with a trimming board and a shear strip thereon, of a shaft generally paralleling said strip, a sleeve reciprocable upon the shaft, a handle projecting laterally from the sleeve and provided with a bearing socket extending a substantial distance through the handle, a knife shaft rotatably mounted in the socket, a knife on the shaft having a cutting edge positioned for operative interaction with the shear strip on the board, and a guard carried by said sleeve and extending arcuately about the knife disk in protecting relation to the edge thereof.

15. The structure set forth in claim 14, in which the rotatable shaft upon which the knife is mounted is slightly angular both in a horizontal plane and a vertical plane respecting a horizontal line normal to said shear strip.

16. The combination with a trimming board having a marginal shear strip, of a supporting rod provided with rack teeth and generally paralleling said shear strip, a knife assembly reciprocable on the rod and including a rotatable knife shaft extending transversely of the rod, and a knife disk mounted thereon in operative interaction with the shear strip, and means including a pinion on said knife shaft meshing with the rack teeth on the rod for positively rotating the knife shaft and knife disk in the course of reciprocation of said assembly upon the rod.

17. The combination with a trimming board marginally provided with a shear strip, of a supporting shaft generally paralleling the shear strip, a sleeve reciprocable upon the shaft and provided with a transverse bearing, a rotatable shaft mounted in the transverse bearing, and a disk knife on the rotatable shaft co-operable with the shear strip, said sleeve being rotatable

as well as reciprocable upon the shaft first mentioned and being provided with a laterally projecting handle adapted to provide a bias force rotatably acting upon said sleeve in a direction to engage the knife disk with the shear strip during normal cutting operation.

18. The device of claim 17 in which the knife shaft extends through a substantial portion of the length of the handle and is angularly disposed with reference to the edge of the shear strip.

LEAH SILVER,
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