

April 27, 1965

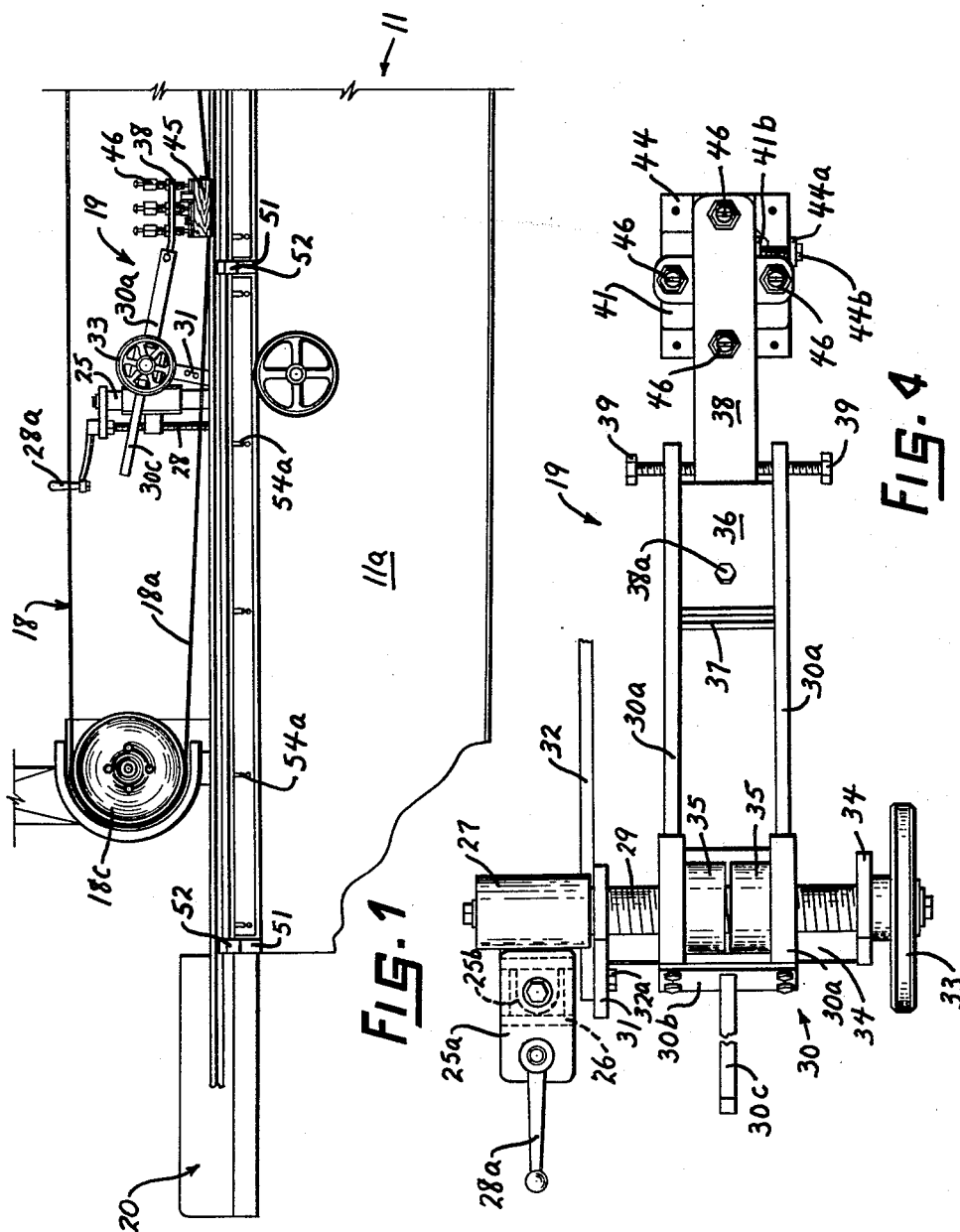
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3,180,061

SANDING MACHINE

Original Filed Sept. 18, 1959

5 Sheets-Sheet 1



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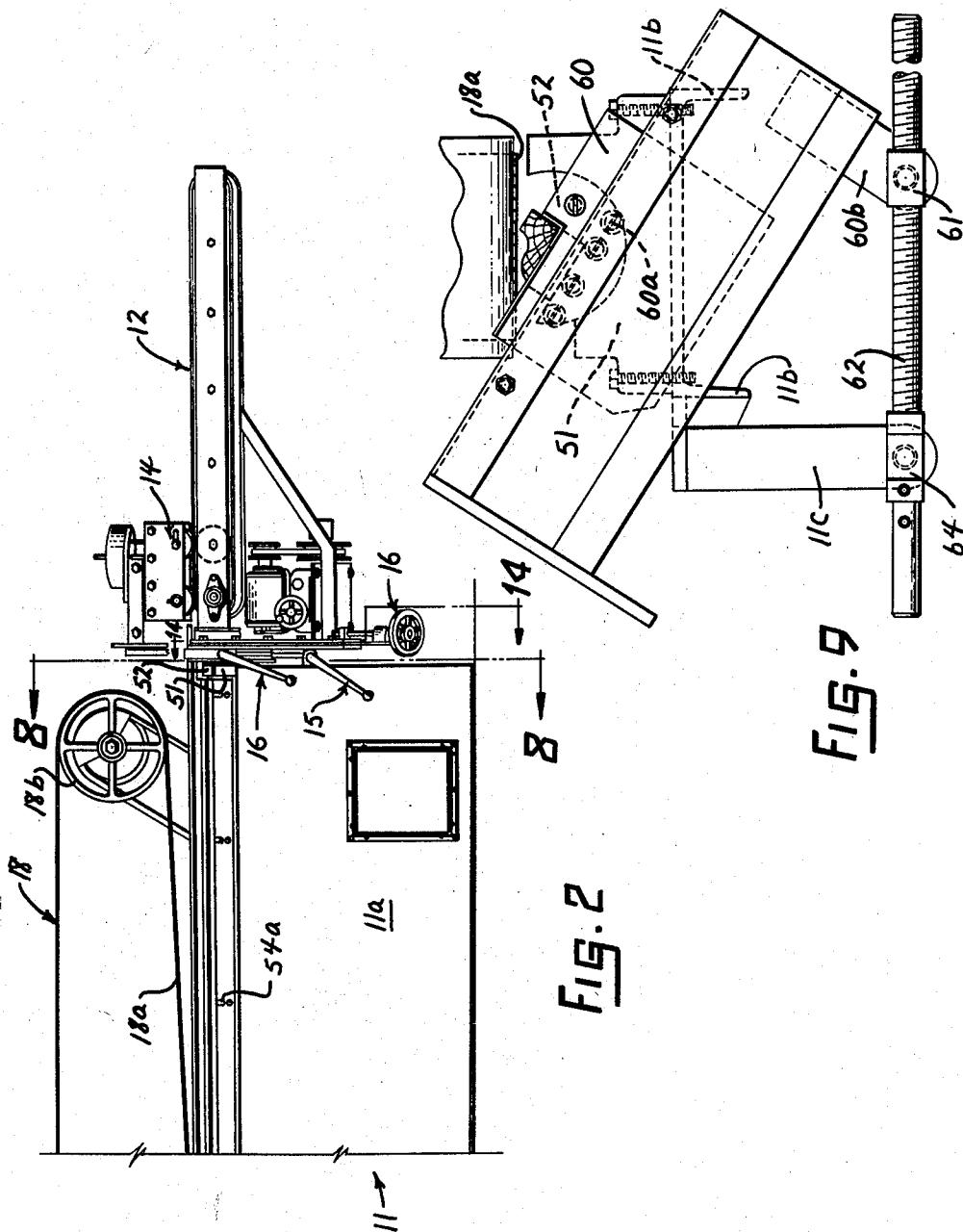


FIG. 2

FIG. 9

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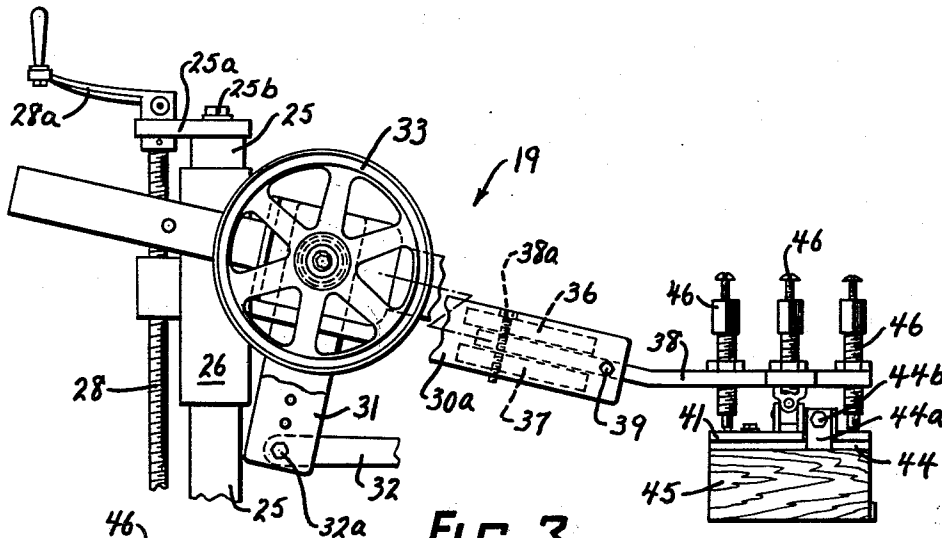


FIG. 3

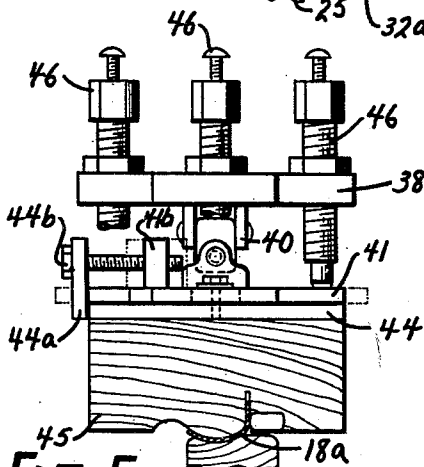


FIG. 6

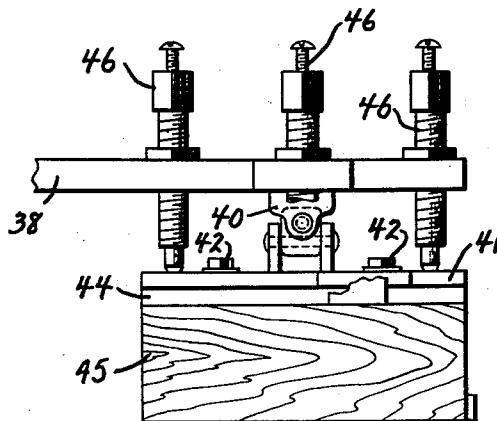


FIG. 5

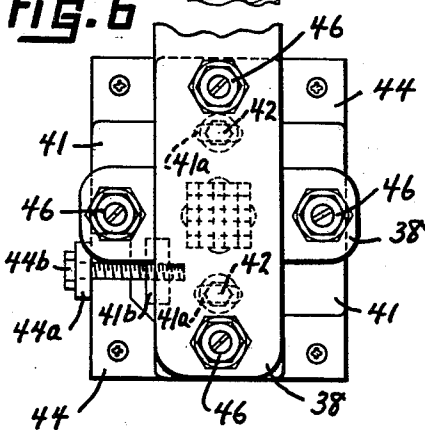


FIG. 7

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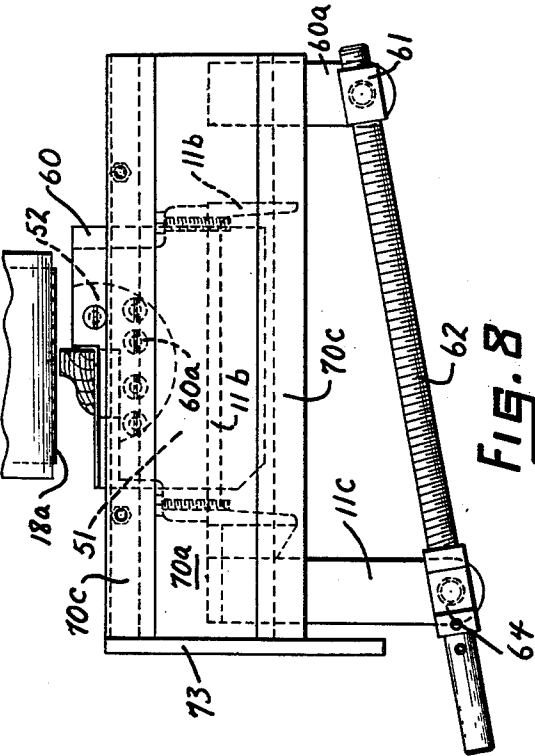


FIG. 8

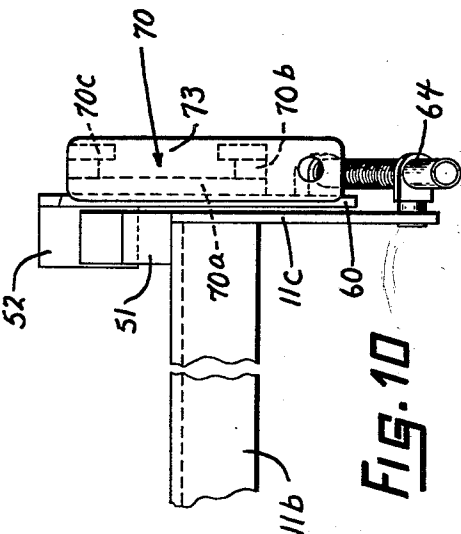


FIG. 10

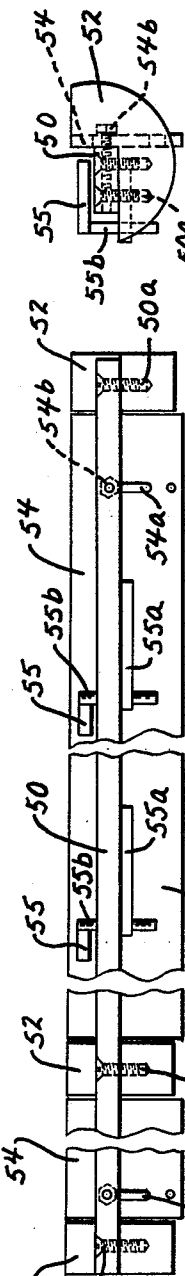


FIG. 11

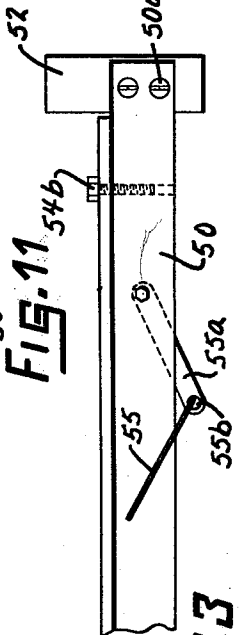


FIG. 12

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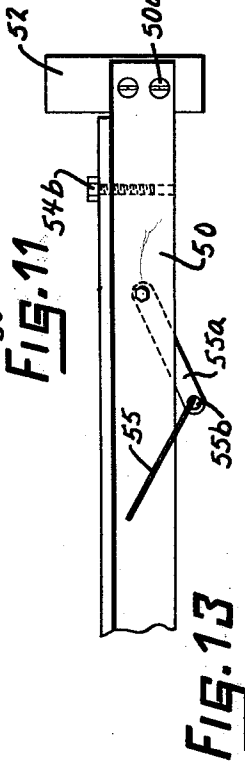


FIG. 13

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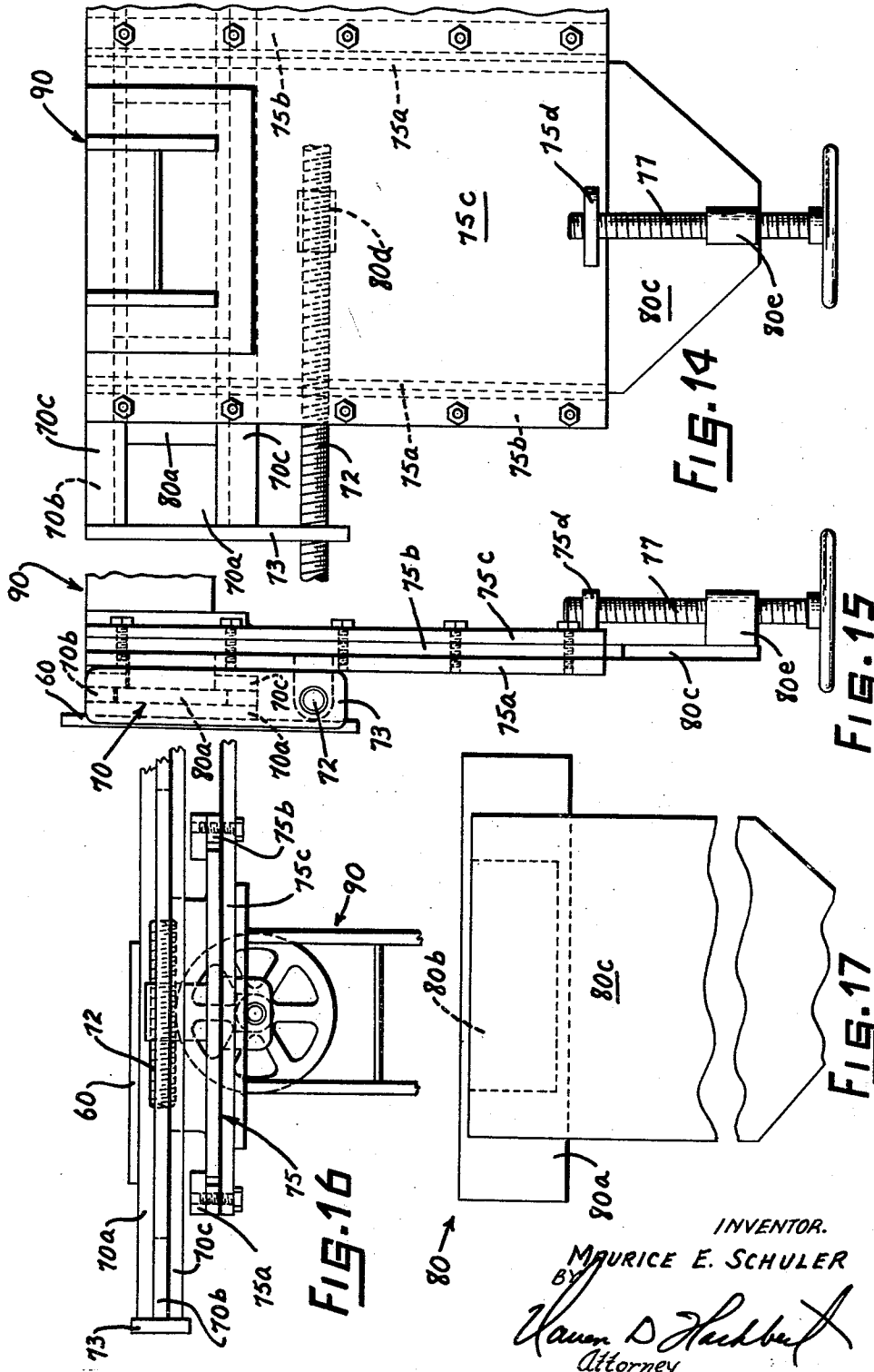
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3,180,061

SANDING MACHINE

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Continuation of application Ser. No. 840,948, Sept. 18, 1959. This application Apr. 11, 1963, Ser. No. 273,262
9 Claims. (Cl. 51—137)

The present invention relates to a sanding machine, and more particularly to a sanding machine which is highly effective for use on stock having an irregularly-shaped outward configuration, the instant application being a continuation of now abandoned patent application Serial No. 840,948, filed September 18, 1959, for Sanding Machine.

Heretofore, the most satisfactory sanding of molding and/or other material having irregular surfaces has been by a tedious hand operation. Although there have been machines designed for such a purpose, these have proven mostly objectionable because of the difficulty of adjustment thereof to secure an effectively sanded finished product. For example, these aforementioned prior machines were not satisfactory in view of the fact that the abrasive belt used for the sanding operation necessarily had to be turned from the generally horizontal plane in which it was traveling, and sometimes at very sharp angles, to engage all of the surface to be sanded. Accordingly, such prior structures actually effected only the accurate sanding of a particular portion of the surface of the irregularly-shaped stock. In addition, the prior type sanding machines made no provision in the sanding carriage assemblies thereof for accommodating any changes in position of the major sanding force on the work being sanded insofar as lateral displacement was concerned, i.e. movement laterally to the normal path of travel of the abrasive sanding belt.

By virtue of the instant invention, the applicant has provided a new and improved sanding machine for molding and the like which is highly effective on stock having virtually any form of irregular outer surface. The sanding machine promotes effective sanding through structure whereby the stock is rotatable preferably at a pivot point disposed above a medial horizontal plane through the stock being sanded, with reference to a generally horizontally disposed abrasive belt. The latter structure affords positive and direct sanding of the irregular surface of the molding without the necessity of bending or folding the abrasive belt out of its normal horizontally disposed traveling position.

In addition, the applicant has provided a new and novel sanding carriage including adjustable means for varying the pressure of the abrasive belt on the work being sanded, with a particular adjustment being provided for moving or adjusting the sanding block forming a part of the sanding carriage assembly in lateral directions with reference to the path of travel of the abrasive belt to permit the application of the most effective sanding force to the surface of the molding being sanded. The latter feature, together with the novel arrangement of components forming the instant sanding carriage assembly, provides for effective adjustment and affords a highly satisfactory sanding operation on stock with practically any type of irregular surface configuration.

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Accordingly, the principal object of the present invention is to provide a sanding machine which permits highly effective sanding of molding or like material having virtually any type of irregularly-shaped surface configuration.

Another object of the present invention is to provide a new and novel sanding machine whereby the work-supporting member thereof is rotatable with reference to the abrasive sanding belt.

A further object of the present invention is to provide a novel sanding carriage assembly for a sanding machine, the components of which may be adjusted in one of several ways to effect an optimum sanding force on the work being sanded.

A still further and more general object of the present invention is to provide a new and novel sanding machine which is capable of various adjustments to permit the effective sanding of a wide range of irregularly-shaped pieces of stock, each of which in a simple yet highly effective manner.

Other objects and a better understanding of the invention will become more apparent from the following description, taken in conjunction with the accompanying drawings, wherein

FIG. 1 is a view in front elevation, partially fragmentary, showing a portion of the over-all sanding machine forming the instant invention, with the work-supporting member thereof being tilted from a horizontal plane;

FIG. 2 is a view in front elevation showing another portion of the sanding machine of FIG. 1, where FIGS. 1 and 2, when combined, disclose the over-all machine;

FIG. 3 is an enlarged view in side elevation, partially fragmentary, showing the novel sanding carriage assembly forming a part of the instant invention;

FIG. 4 is a plan view of a sanding carriage assembly of FIG. 3;

FIG. 5 is an enlarged detailed view of the sanding block-supporting structure forming a part of the sanding carriage assembly of FIGS. 3 and 4;

FIG. 6 is a view in end elevation of the sanding block-supporting structure of FIG. 5;

FIG. 7 is a plan view of the sanding block-supporting structure of FIG. 6;

FIG. 8 is a view in end elevation of the assembly for rotating the work-supporting member of the instant novel sanding machine, taken generally at line 8—8 of FIG. 2 and looking in the direction of the arrows, but with the work being shown in a horizontal position;

FIG. 9 is a view similar to that of FIG. 8, but showing the work-supporting member, and the work thereon, in a rotated position;

FIG. 10 is a view in end elevation, generally corresponding to the structure of FIG. 8, showing particular details thereof;

FIG. 11 is a detailed view of one of the members forming a part of the rotatable work-supporting assembly of FIGS. 8 and 9;

FIG. 12 is a detailed view in front elevation of the work-supporting assembly of FIG. 11;

FIG. 13 is a fragmentary plan view of the work-supporting assembly of FIGS. 11 and 12;

FIG. 14 is a fragmentary and isolated view of the mechanism used for adjusting the work-feeding mechanism in a generally up-and-down and forward-and-back-

ward direction, taken generally at line 14—14 of FIG. 2 and looking in the direction of the arrows, but with the over-all mechanism in an untilted position;

FIG. 15 is a view in end elevation of the structure of FIG. 14, showing further details thereof;

FIG. 16 is a plan view of the structure of FIGS. 14 and 15, showing still further details thereof; and,

FIG. 17 is a detailed view in front elevation of the support member forming a part of the mechanism of FIGS. 14, 15 and 16.

For the purposes of promoting an understanding of the principles of the inventions, reference will now be made to the embodiments illustrated in the drawings and specific language will be used to describe the same. It will nevertheless be understood that no limitation of the scope of the inventions is thereby intended, such alterations and further modifications in the illustrated device, and such further applications of the principles of the inventions as illustrated therein being contemplated as would normally occur to one skilled in the art to which the inventions relate.

Referring now to FIGS. 1 and 2, the applicant's novel sanding machine comprises a base assembly 11, the specific structural details of which are not shown, but which include legs and other supporting framework having a sheet metal covering 11a therearound, and on the top of which is an upper frame member 11b (see FIGS. 8 and 9). The sanding machine also includes as a part thereof a belt-type feeding mechanism 12, a belt-type contact mechanism 14, adjustment mechanism 15 for rotating a work-supporting member 50 on structure disposed on the upper frame member 11b of the machine, adjustment mechanism 16 for varying the relative position of the feeding mechanism 12 with reference to the work-supporting member 50, an abrasive belt assembly 18 positioning an abrasive belt 18a of the type commonly used in the wood-working industry, a sanding carriage assembly, and a finished work table 20.

Briefly, and as a matter of orientation, sanding is accomplished by placing the stock to be sanded, such as wood molding, for example, on the belt-type feeding mechanism 12, the belt thereof feeding the stock towards the belt-type contact mechanism 14 and the body of the sanding machine, where it moves upon the work-supporting member 50 thereof. The work-pieces are then urged along the work-supporting member 50 and under the sanding carriage assembly 19, which sanding carriage assembly 19 has a portion thereof urging the abrasive belt 18a onto the work-pieces to effect the sanding action. The work-pieces then move from the sanding machine onto the finished work table 20 disposed at the opposite end of the machine from the feeding mechanism 12. It should be understood that, all the preceding components are to be discussed herebelow, but that the over-all operational sequence stated above is merely to indicate the various stages involved during the representative sanding of the work.

Considering now the structure and operation of the sanding carriage assembly 19 forming a part of the instant invention, and as particularly disclosed in FIGS. 1 and 3 to 7, inclusive, a vertical support member 25, extending upwardly from the framework of the machine, has a movable sleeve 26 thereon, to which sleeve 26 another sleeve 27 is secured, as by welding, for example, the latter sleeve 27 serving as a bearing area for the remaining components of the sanding carriage assembly 19. The vertical support member 25 has a plate 25a affixed to the top surface thereof, as by a nut and bolt means 25b, for example, and through which a handle 28a connects to the upper end of a threaded shaft 28 which extends downwardly to and is positioned on the framework of the sanding machine. Inasmuch as the sleeve 26 has an extension 26a through which the threaded shaft 28 passes, movement of the handle 28a and the threaded shaft 28 ef-

fects upward and downward displacement of the sleeve 26 with reference to the top surface of the sanding machine, and hence upward and downward movement of the sanding carriage assembly 19.

A threaded shaft 29 extends from the sleeve 27 through a frame assembly 30 comprising side members 30a having a back member 30b in removable engagement therewith (see FIGS. 3 and 4). A control member 31 has one end thereof threadedly secured to the shaft 29, with its other end pivotally fastening to an elongated connecting member 32 at 32a, the latter forming a part of a clutch-like arrangement (not fully shown) for selectively positioning the sanding block 45 in or out of engagement with the abrasive belt of the abrasive belt assembly 18, to be discussed herebelow.

An operating wheel 33 connects to the free end of the threaded shaft 29 adjacent a frame member 34 which extends from the control member 31, and serves to permit selective lateral movement of the frame assembly 30 and hence the sanding block 45 across the abrasive belt. In the latter regard, it should be noted that the frame assembly 30 is positioned on the threaded shaft 29 through nut members 35 which are in releasable engagement with the side members 30a thereof. An extension member 30c is secured to the back member 30b of the frame assembly 30 for receiving one or more weights (not shown) used to vary and counterbalance the application force of the sanding block 45 to the work.

The opposite end of the frame assembly 30 has plates 36 and 37 extending between the side members 30a thereof, with a support arm 38 being disposed between the aforementioned plates 36 and 37 and pivotable at 38a. The range of pivoting movement of the support arm 38 may be controlled by screws 39 which extend through the side members 30a of the frame assembly 30.

The support arm 38 forms a part of the sanding block support structure which comprises a universal type joint 40 centrally disposed therebeneath near the free end thereof, which universal joint 40 supports a plate member 41 having elongated openings 41a therein for receiving bolts 42 which extend into another plate member 44 threadedly secured to the top surface of the sanding block 45. Also extending downwardly through the support arm 38 are spring-urged leveling members 46, which are conventional in form, and which serve to distribute pressure, as desired, onto the top surface of the plate member 41.

Extending upwardly from the plate member 44 is an arm 44a, from which a threaded bolt 44b extends into an ear 41b disposed upwardly from the plate member 41. It should be understood that when the bolts 42 are released for movement in elongated openings 41a, and when the bolt 44b is rotated, the plate member 44, and hence the sanding block 45, may be moved with reference to the plate member 41. When the desired position is assumed, the bolts 42 are tightened to secure the over-all assembly.

The above structure, and particularly the adjustment provided by the threaded bolt 44b, is important when defining the major sanding pressure or force on the work being sanded, which major pressure should be centered on the work. Although the leveling members 46 are important insofar as independent pressure adjustment is concerned, use of the latter do not laterally move the major sanding pressure centrally onto the work, but instead vary the pressure, as desired, on particular details of the molding being sanded.

With reference now to the adjustment mechanism 15 for rotating the work-supporting member 50, as particularly disclosed in FIGS. 8 to 13, inclusive, the upper frame member 11b of the sanding machine is adapted to receive members 51 which are preferably spaced equidistantly apart from each other (see FIGS. 1 and 2).

Elements 52, which are rotatably received in the members 51, each have a cutout portion approximating the upper section thereof, which cutout portion receives the work-supporting member 50 which is typically secured thereto by means of flush-type screws 50a, for example. It should be apparent, therefore, that the positioning of the screws 50a also serve to retain the elements 52 in the desired spaced-apart relationship.

Disposed between the respective elements 52 are fences 54, each of which have several vertically extending elongated slots 54a therein for receiving bolts 54b which extend into openings disposed in a side surface of the work-supporting member 50. By loosening the bolts 54b, each of the fences 54 may be raised or lowered, depending upon the particular configuration of the molding being sanded by the machine. The above-discussed portion of the rotating assembly for the work-supporting member 50 is completed by the use of deflector-type members 55, which, in a preferred embodiment of the invention, are made from spring steel, for example, each positioned on an arm 55a secured to the under surface of the work-supporting member 50 through a vertical support 55b. All of the preceding structural relationship should be particularly apparent from FIGS. 11, 12 and 13.

With reference now to FIGS. 8, 9 and 10, the element 52 disposed adjacent the feeding mechanism 12 has a plate member 60 secured thereto, as by common flush-type screws 60a, for example, which plate 60 serves as a support for the feeding mechanism 12, and the associated components therefor, so that upon rotation of plate 60, as discussed herebelow, the work-supporting member 50 rotates, as well as the latter mechanism. In addition, in view of the relation of the contact mechanism 14 to the feeding mechanism 12 (see FIG. 2), the former is also rotatable with plate 60.

The particular rotation of the plate 60 is accomplished by means of structure comprising a downwardly extending control arm 60b, integral with or fixedly secured to the plate 60, having a universal joint 61 rotatably mounted thereon into which a threaded shaft 62 is received. Extending outwardly and downwardly from the upper frame member 11b is a support member 11c (see FIGS. 9 and 10) which also has a universal joint 64 rotatably secured thereto, the latter receiving the other end of the threaded shaft 62. Inasmuch as the support member 11c is fixedly secured to the framework of the sanding machine, the rotation of the threaded shaft 62 effects movement of the plate 60 through downwardly extending control arm 60b and universal joint 61 from a position where the work-supporting member 50 on the element 52 is in a generally horizontal plane (see FIG. 8) to a position where the latter is at an acute angle with reference to the horizontal plane (see FIG. 9). In a typical embodiment of the invention, the range of rotation can be approximately 45°, for example.

It should be particularly understood from the above that by providing structure for rotating the work with respect to the abrasive belt forming a part of the abrasive belt assembly 18, direct face-to-face engagement can be made between the abrasive belt and the particular irregular surface of the work being sanded by means of the sanding block 45, without the necessity of bending or otherwise folding the abrasive belt. Thus, highly effective sanding action is secured, as well as maximum utilization of the abrasive surface of the belt. In addition, and most importantly, the desired sanding action also results by reason of the structural relationship whereby the rotation is effected at a pivot axis at or above a medial horizontal plane through the work, therefore requiring a minimum rotational displacement to effect the fine adjustment necessary to accommodate any configuration on the surface of the work being sanded.

With reference now to the adjustment mechanism 16 for the forward-and-backward and upward-and-downward movement of the feeding mechanism 12, as particularly

indicated by FIGS. 14, 15, 16 and 17, the plate 60, referred to hereabove in connection with the work-supporting member 50 rotating mechanism, is secured to a plate 70a, as by welding, for example, which, together with members 70b and 70c define a channel-way 70 (see FIGS. 8, 10, 14 and 15). A support member 80 has a portion 80a thereof received in the channel-way 70, with an intermediate portion 80b of the support member 80 connecting to a downwardly extending portion 80c thereof, the latter relationship being particularly evident with reference to FIG. 17. It should be further apparent from FIGS. 14, 15 and 16 that the feeding mechanism 12 is secured to the presently described adjustment mechanism 16 through bracket assembly 90 secured to a plate member 75c, the latter to be discussed further herebelow.

Forward-and-backward movement of the feeding mechanism 12 is accomplished by means of a rotatable shaft 72 which extends through a face plate 73 disposed at one end of the channel-way 70, the other end of the rotatable shaft 72 extending into a sleeve-like element 80d secured to a surface of portion 80c of support member 80 (see FIG. 14). It should be understood then that when shaft 72 is rotated, the portion 80a of support member 80 is moved in a forward or backward direction in channel-way 70 through action on portions 80b and 80c thereof. With the latter movement, plate member 75c also moves, thereby permitting the forward-and-backward movement of the feeding mechanism 12.

Upward-and-downward movement of the feeding mechanism 12 is accomplished through another channel-way 75 defined by members 75a and 75b and the aforementioned plate member 75c. Channel-way 75 is adapted to receive the portion 80c of the support member 80 (see FIG. 16). Member 75c has an ear 75d extending threadedly therefrom through which a rotatable shaft 77 is threadedly received, with portion 80c of support member 80 also having an ear 80e thereon threadedly engaging the shaft 77. Inasmuch as the feeding mechanism 12 extends from member 75c, when it is desired to either raise or lower the latter, the threaded shaft 77 is rotated so that the channel-way 75 moves with reference to the portion 80c of the support member 80.

Thus, from the preceding it should be apparent that the instant sanding machine provides novel structure whereby the feeding mechanism 12 may be adjusted forward-and-backward and upward-and-downward with reference to the work-supporting member 50, such action being readily effected through the utilization of a novel support member 80. In addition, and as also discussed hereabove, the applicant has provided a novel adjustment mechanism whereby the work being sanded may be rotated with reference to the abrasive sanding belt disposed thereabove, with such rotational displacement of the work providing direct face-to-face pressure on the portion of the work being sanded, optimum utilization of the abrasive belt, and a sensitive adjustment feature, the latter being particularly important with respect to the defined pivot axis of the rotatable element on which the work-supporting member 50 is disposed.

In regard to the over-all mechanism forming the instant sanding machine, it might be briefly noted that the abrasive belt 18a is disposed around a driven pulley 18b and an idler pulley 18c, all forming a part of the abrasive belt assembly 18 and all of which are well-known in the art. In addition, provision may be made in the machine, although not described herein, for raising or lowering the general path of travel of the abrasive belt, as well as for moving a portion of the frame of the machine in a forward-and-backward direction, as desired. Other components included as a part of an operative sanding machine forming the instant invention is the conventional power source for driving the feeding mechanism 12 and the contact mechanism 14 which, in the preferred embodiment of the invention, are interconnected with uni-

versal type joints (not shown), or other means, so that the respective belts forming a part of each operate at an equal and a uniform rate of travel.

It should be evident from the above that the applicant's sanding machine is highly versatile insofar as adjustment features thereof are concerned. The sanding machine is readily used when the work is being fed onto the work-supporting member 50 by releasing the clutch to drop the sanding carriage assembly 19, and particularly the sanding block 45, into contact with the abrasive belt, the abrasive surface of which is then urged into contact with the work through a complementary configuration disposed on the face of the sanding block 45 corresponding to the desired pattern of the molding or like material being fed through the machine. The sanding block 45 may be carefully adjusted through the novel structure disclosed hereabove so that it is centered over the work being sanded to permit the optimum sanding pressure thereon and, hence, effective sanding action.

If desired, weights may be affixed to the member 30c as a counterbalancing measure where a light pressure is required on work being finished. Moreover, although more particularly disclosed hereabove, the deflectors 55, as well as the movable fences 54, found in connection with the work-supporting member 50 and the elements 52 on which the latter is disposed, are readily adjustable, the former serving to urge the work being sanded into a defined path of travel, while the latter providing versatility insofar as various-shaped stock is concerned. Moreover, it should be understood that the applicant's novel sanding machine is susceptible to various changes within the spirit of the invention, and, thus the above description should be considered illustrative and not as limiting the scope of the following claims.

I claim:

1. A sanding machine comprising a framework, an endless abrasive belt having a reach mounted on said framework, mounting means to movably position a work-supporting member on said framework below said endless abrasive belt and parallel with said reach, said mounting means including a first element having an arcuate surface mounted on said framework, and a second element mounting said work-supporting member received on said arcuate surface of said first element and rotatable with respect to said framework, said arcuate surface having a generatrix which lies parallel with said reach of said endless abrasive belt, the axis of said generatrix being fixedly disposed along a path beginning at the work-engaging surface of said work-supporting member and extending towards the plane of said endless abrasive belt, and means rotating said second element of said mounting means.

2. A sanding machine comprising a framework, an endless abrasive belt having a reach mounted on said framework, mounting means to movably position a work-supporting member on said framework below said endless abrasive belt and parallel with said reach, said mounting means including a first element having an arcuate surface mounted on said framework, and a second element mounting said work-supporting member received on said arcuate surface of said first element and rotatable with respect to said framework, said arcuate surface having a generatrix which lies parallel with said reach of said endless abrasive belt, the axis of said generatrix being disposed above the vertical level of said work-supporting member, and means rotating said second element of said mounting means.

3. A sanding machine comprising a framework, an endless abrasive belt having a reach mounted on said framework, mounting means to movably position a work-supporting member on said framework below said endless abrasive belt and longitudinally of said reach, said mounting means including a first element having an arcuate surface, and a second element mounting said work-sup-

porting member received on said arcuate surface and rotatable with respect to said framework, said arcuate surface having a generatrix which lies parallel with said reach of said endless abrasive belt, the axis of said generatrix being disposed intermediate the work-engaging surface of said work-supporting member and said abrasive belt, feeding mechanism introducing work onto said work-supporting member, means rotating said feeding mechanism longitudinally of said reach of said endless abrasive belt, and means rotating said second element of said mounting means.

4. A sanding machine comprising a framework, an endless abrasive belt having a reach mounted on said framework, mounting means to movably position a work-supporting member on said framework below said endless abrasive belt and longitudinally of said reach, said mounting means including a first element having an arcuate surface mounted on said framework, and a second element positioning said work-supporting surface received on said arcuate surface and rotatable with respect to said framework, said arcuate surface having a generatrix which lies parallel with said reach of said endless abrasive belt, the axis of said generatrix being vertically disposed at least at the plane of the work-engaging surface of said work-supporting member, feeding mechanism introducing work onto said work-supporting member, contact mechanism controlling flow of said work onto said work-supporting member, means rotating said feeding mechanism longitudinally of said reach of said endless abrasive belt, means rotating said contact mechanism longitudinally of reach of said endless abrasive belt, and means rotating said second element of said mounting means.

5. The sanding machine of claim 4 where said feeding mechanism and said contact mechanisms rotate simultaneously and in equal increments.

6. A sanding machine comprising a framework, an endless abrasive belt having a reach mounted on said framework, mounting means to movably position a work-supporting member on said framework below said endless abrasive belt and longitudinally of said reach, said mounting means including a first element having an arcuate surface disposed on said framework, and a second element mounting said work-supporting member received on said arcuate surface and rotatable with respect to said framework, said arcuate surface having a generatrix which lies parallel with said reach of said endless abrasive belt, the axis of said generatrix being vertically disposed at least at the level of said work-supporting member, and means rotating said second element of said mounting means.

7. In a sanding carriage assembly having an abrasive member forming a part thereof, a sanding block supporting structure comprising a support bracket, a first plate member universally mounted from said support bracket, a second plate member selectively secured to said first plate member in sliding relationship, a sanding block secured to said second plate member, resilient pressure members disposed on said bracket balancing said first plate member with reference to said bracket, and control means interconnecting said first and said second plate members slidably adjusting said second plate member and said sanding block with reference to said first plate member.

8. A sanding machine comprising a framework, an endless abrasive belt having a reach mounted on said framework, mounting means to movably position a work-supporting member on said framework below said endless abrasive belt and longitudinally of said reach, said mounting means including a first element having an arcuate surface mounted on said framework, a second element positioning said work-supporting member received on said arcuate surface and rotatable with respect to said framework, said arcuate surface having a generatrix which lies parallel with said reach of said endless

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abrasive belt, the axis of said generatrix being vertically disposed at least at the level of said work-supporting member, means rotating said second element of said mounting means, a feeding mechanism introducing work onto said work-supporting member, and mechanism adjustably positioning said feeding mechanism with reference to said work-supporting member in a plane normal to the path of movement to said endless abrasive belt.

9. The sanding machine of claim 8 where said feeding mechanism is rotatable with said second element of said mounting means.

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