Dec. 13, 1960 G. J. VOELZ 2,963,831

SANDING MACHINE

Filed Oct. 29, 1957 3 Sheets-Sheet 1

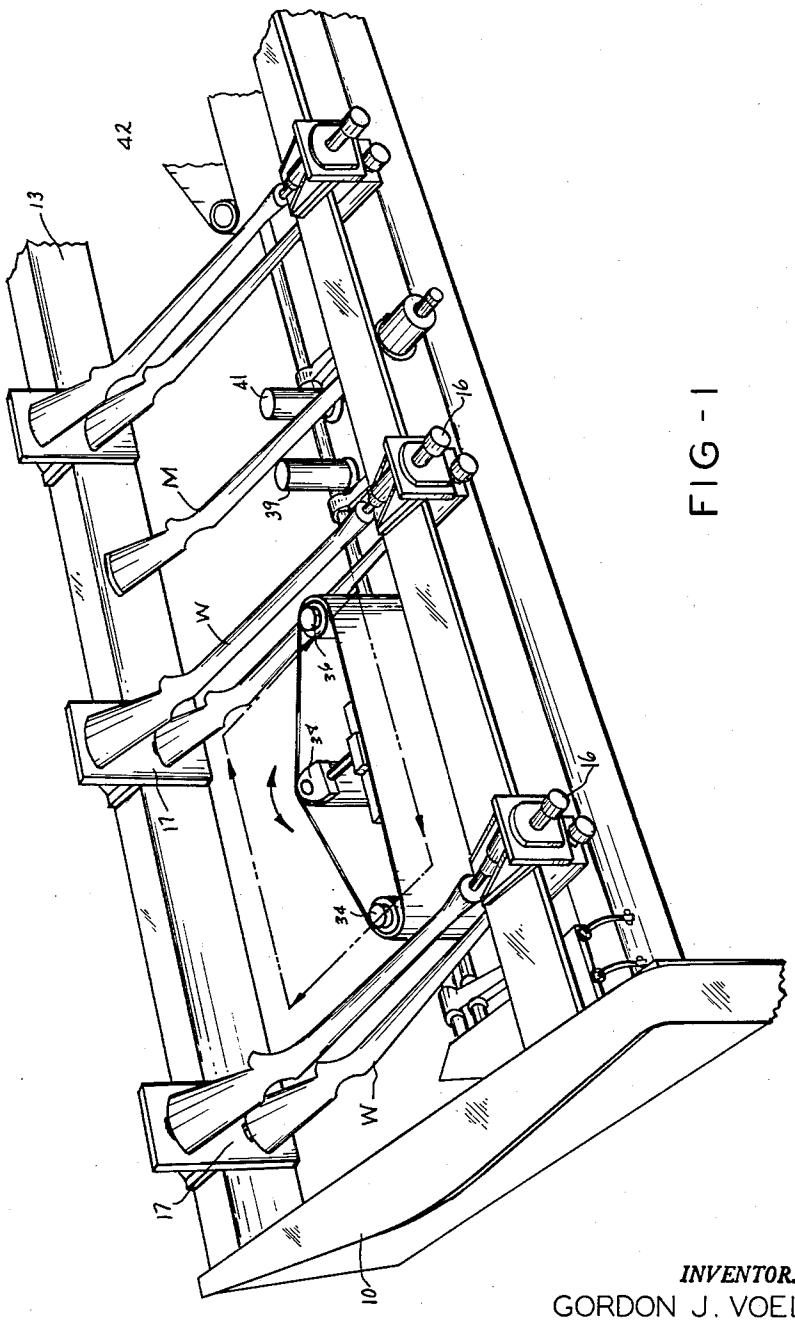


FIG - 1

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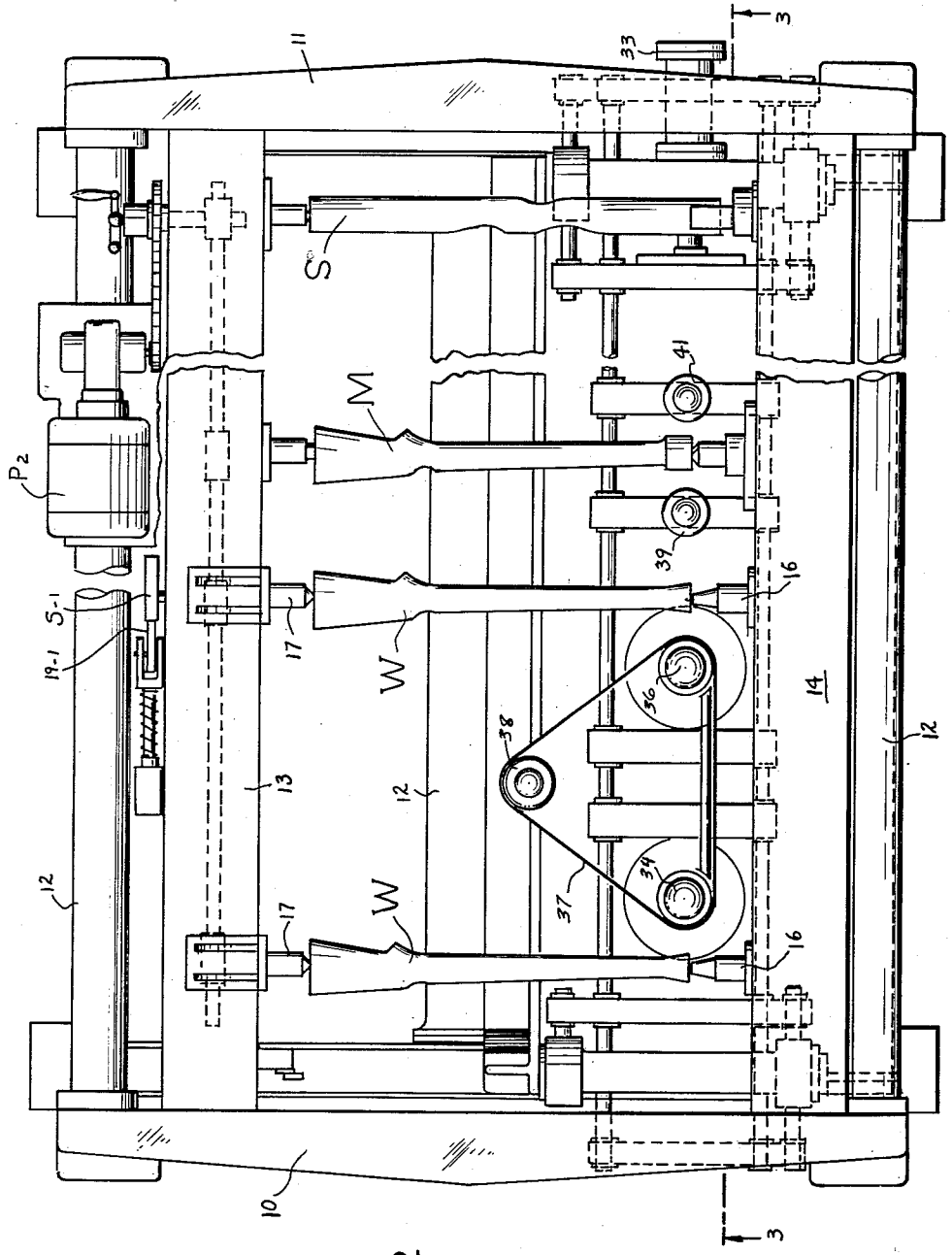


FIG-2

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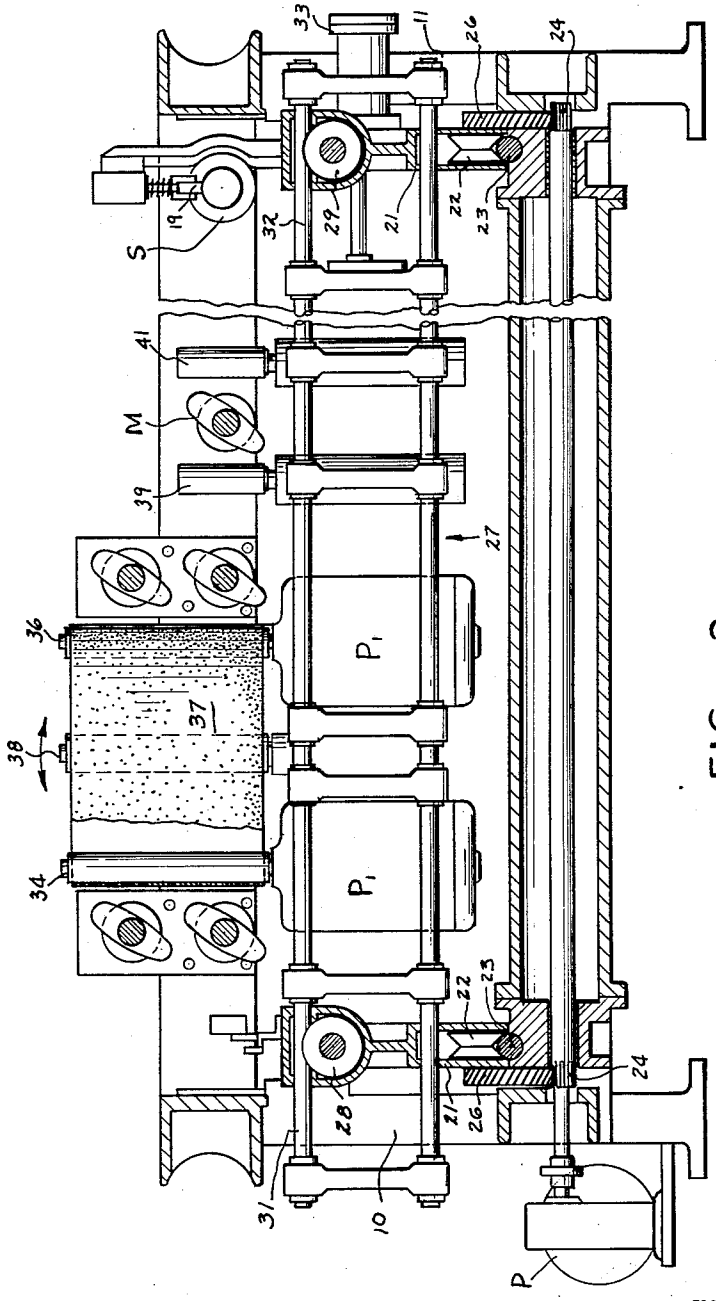


FIG - 3

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2,963,831

SANDING MACHINE

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2 Claims. (Cl. 51—142)

The present invention relates to sanding machines and in particular to machines operative to sand wooden work pieces such as gun stocks. The invention also relates to a process practiced by the operation of said machine.

The invention is an improvement in the machine disclosed and described in U.S. Patent 2,667,901, issued February 2, 1954, to Salstrom et al.

In the present invention, there is contemplated a sanding machine having a fixed frame for supporting a plurality of spindles in turn supporting work pieces in the form of wooden blanks. The work pieces are spaced apart and are arranged in a generally parallel fashion.

The frame also supports a first carriage which is movable to and fro in a reciprocatory manner relative to the frame and relative to the work pieces along a path generally parallel to the axis about which the work pieces rotate. The first carriage supports a second carriage which is also movable to and fro in a reciprocatory manner but along a path which is perpendicular to the line of motion of the first carriage. The second carriage supports a belt sander which, by virtue of the mobility of the first and second carriages, is coordinately movable with respect to the work pieces effective to sand the work piece.

A master cam and follower is provided, usually an image of the surface contour to be sanded, effective to control motion of the second carriage and thus, the sander, along a path normal to the work pieces. A second cam and follower means is provided for regulating the speed with which the sander traverses the work piece. A third cam and follower means is also provided for regulating the speed with which the work pieces revolve

Accordingly, it is a particular feature of the present invention to provide a sanding machine operable to sand wooden work pieces, such as gun stocks, automatically.

It is a further object of the present invention to provide a sanding machine including a belt sander movable coordinately under the control of cams effective to sand a wooden element having an irregular surface contour including complex curves.

A further object of the invention is the provision of a sanding machine including a movably mounted belt sander operable to sand a plurality of work pieces simultaneously.

A sanding machine embracing certain principles of the present invention may comprise a main frame, a plurality of spindles mounted in the frame for receiving a corresponding number of work pieces, a first carriage mounted in the frame and movable to and fro along the longitudinal axis of the work pieces, a second carriage supported by the first carriage and movable relative to said first carriage along a path perpendicular to said longitudinal axis, a belt sander mounted upon the second carriage and operable by virtue of the motion of said first and second carriages to engage said work pieces, means for moving the first carriage relative to the frame and

for moving the second carriage relative to the first carriage effective to bring the sanding machine into contact with the work pieces and control means including a master pattern for regulating the relative motion of both said carriages.

A process practiced by the operation of said machine may include the steps of arranging a plurality of work pieces in at least two spaced tiers, disposing a belt sander between said spaced tiers of work pieces, rotating the work pieces slowly about their longitudinal axes and moving the belt sander along a rectangular path between the tiers of work pieces and bringing the sander into contact alternately with one tier of work pieces and then with another to effect a continuous sanding operation.

Other features and advantages of the present invention will become more apparent from an examination of the succeeding specification when read in conjunction with the appended drawings in which:

Fig. 1 is a perspective view in schematic form of a portion of a machine embracing the principles of the present invention;

Fig. 2 is a plan view of the machine of Fig. 1 showing in greater detail the improvement of the present invention; and,

Fig. 3 is a vertical section of Fig. 2 as viewed in the plane of the line 3—3.

In view of the fact that the present invention represents an improvement over the machine disclosed in said Salstrom patent, only those details thereof which are necessary to explain the present invention will be described.

The main frame is composed of two vertical supports **10** and **11** tied together by transverse tubular elements **12**. A pair of horizontal bars **13** and **14** span the vertical supports and carry a plurality of spindles indicated generally by the reference numerals **16** and **17**. The spindles support a corresponding number of work pieces indicated by the letter W.

A master cam indicated by the letter M and having followers **39** and **41** is also supported by the bars **13** and **14**. The master cam in cooperation with the follower **39** controls sanding of the work pieces disposed to the right of the sanding element (Fig. 1) while the master cam and follower **41** control sanding of work pieces on the opposite side. A speed control cam indicated by the letter S cooperates with a follower **19** for controlling the speed of advance of the sanding machine. Correspondingly, a speed control cam S–1 having a follower **19–1** is effective to control the speed of motor P–2 and thus control the rotational speed of the work pieces W, and the cams M and S.

A primary carriage **21** having rollers **22** is supported in the main frame by a pair of rods **23**. The carriage is driven to and fro along the rods and parallel to the axis of rotation of the work pieces by means of a reversible motor indicated by the letter P through pinions **24—24** and racks **26—26** under the influence of speed control cam S and follower **19**.

The primary carriage **21** in turn supports a secondary carriage characterizing a tubular frame indicated generally by the reference numeral **27** wherein two pairs of rollers **28** and **29**, respectively, carried by the primary carriage are in rolling contact with tubular elements **31** and **32** of the tubular frame. A double acting air cylinder **33** is utilized for actuating the tubular frame and for holding the belt sander in contact with the work pieces in a manner which will become more apparent hereinafter.

A pair of motors P1—P1 are suitably mounted in the tubular frame and are fitted with pulleys **34** and **36** op-

erative in cooperation with an idler pulley **38** to drive an endless belt of sanding paper or cloth **37**.

As is more apparent in Fig. 1, the belt **37** is led around idler pulley **38**. The pulley is pivotally mounted at its lower end so that its axis of rotation may be moved to and fro through an arc in the direction of the arrow shown in Fig. 1 effective to keep the sanding belt on the driving pulleys **37** in a well known manner.

The reversible motor P is effective to move the primary carriage to and fro in a direction parallel to the longitudinal axes of the work pieces W while the air piston **33** is operative to move the tubular frame **27** in a reciprocatory manner along a path generally perpendicular to the longitudinal axes of the work pieces with the result that the belt sander follows a box-like path indicated by the arrows of Fig. 1.

The secondary motor **P2** is operative through suitable gearing to rotate the work pieces W, the master cam M and speed control cams S and S–**1**.

As stated previously, the tubular carriage is provided with a pair of followers **39** and **41** each engageable with the master cam on opposite sides thereof.

For example, the air piston **33** is operative to drive the tubular frame to the left as viewed in Fig. 1 so that the follower **41** engages the master cam thus controlling contact between the belt sander and the work pieces W tiered to the left of the belt sander as the sander proceeds along in the direction of the arrows. After the sander has traversed the full length of the work piece the hydraulic piston is operative to withdraw the belt sander from a left hand group or tier of work pieces and is moved into engagement with the work pieces on the opposite hand. Correspondingly, cam follower **39** engages the opposite side of the master cam to control the contact of the belt sander as it traverses the work pieces on the right side.

The belt sander continues to follow the box-like or rectangular path until the work pieces have been rotated through 360° whereupon a suitable limit switch shuts down the machine.

Any number of belt sanding devices may be mounted in the tubular frame **27** and there is no limit to the width of the belt sander necessary to accommodate stacked or tiered work pieces as disclosed in Fig. 1. For example, it is anticipated that an additional sander could be disposed in the area indicated generally by the reference numeral **42** and any number of work pieces may be tiered one above the other as consideration of convenience and economy of design may dictate.

Furthermore, it is anticipated that the belt sander may be disposed vertically in contrast to the horizontal disposition thereof shown in Fig. 1. By the same token, the present invention is not limited to the horizontal disposition of the work pieces recognizing that for certain applications designers may prefer to dispose the work pieces vertically.

It is anticipated that a variety of arrangements and dispositions of the sanding machine with respect to work pieces may be devised without departing from the spirit and scope of the present invention.

What is claimed is:

1. An apparatus for sanding work pieces, such as gun stocks, having irregular surface contours including complex curves comprising a frame, a pair of movable carriages mounted in the frame, spindle means for rotatably supporting a plurality of spaced groups of work pieces carried by the frame, a belt sander mounted upon one of said carriages and disposed between two groups of said work pieces, said carriages being movable relative to one another and relative to the frame effective to bring the sander into contact with individual groups of work pieces sequentially and cam control means including a pair of cam followers for regulating the motion of the belt sander in accordance with a master pattern, one follower being operative when said sander is in contact with a first group of said two groups of work pieces and the other follower being operative when the sander is in contact with the second group of said two groups of work pieces whereby a sanding operation is performed upon either the first or upon the second group of work pieces when the belt sander moves to and fro in a reciprocatory fashion along a path generally parallel to the axis about which the work pieces rotate.

2. A method for sanding a plurality of wooden gun stocks automatically and in simultaneous fashion comprising the steps of arranging the work pieces in at least two spaced tiers, disposing a belt sander between said tiers of work pieces, rotating the work pieces slowly about their longitudinal axes, moving the belt sander to and fro along a path generally parallel to the longitudinal axis of the work pieces and bringing the sander into contact with a first tier of work pieces while the sander is moving in a first direction and bringing the sander into contact with a second tier of work pieces when the sander is moving in the opposite direction so as to effect a sanding operation during the entire duration of said reciprocatory stroke.

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