

Sept. 29, 1942.

B. F. FOWLER

2,296,990

BACKING SHOE FOR SURFACE FINISHING APPARATUS

Filed Dec. 29, 1939

2 Sheets-Sheet 1

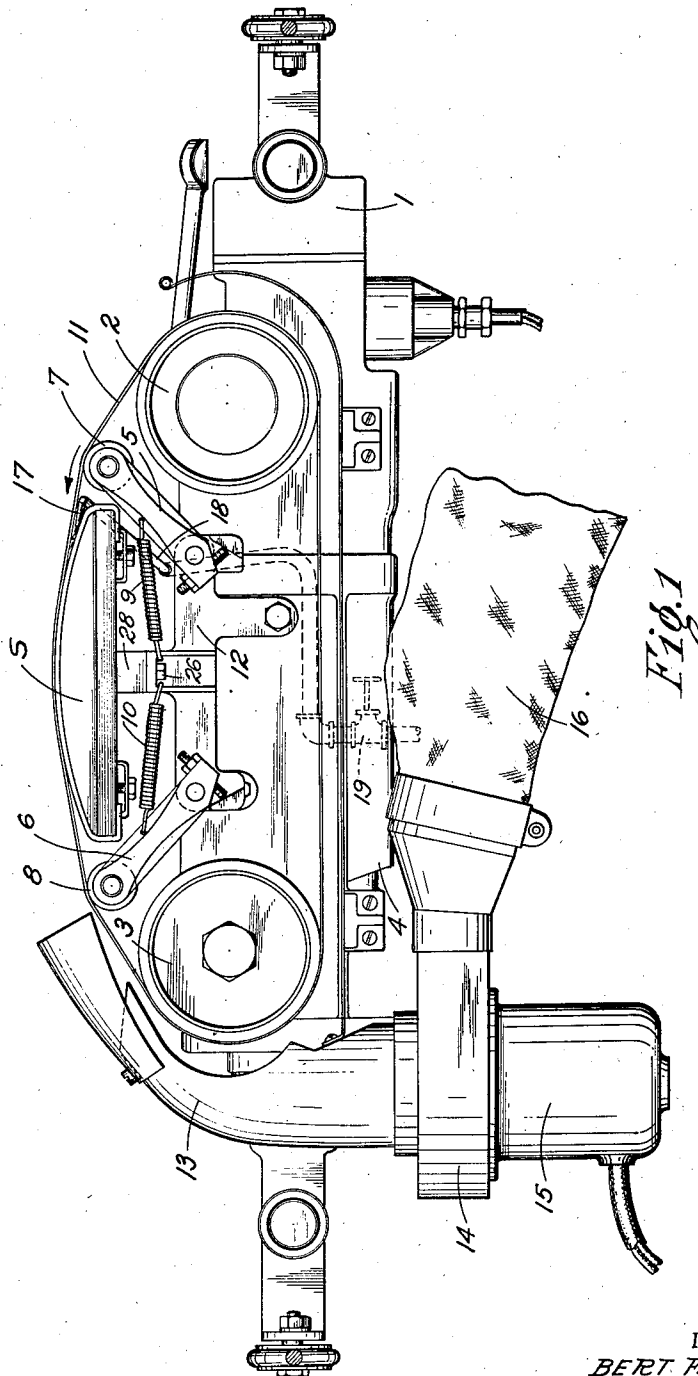


Fig. 1

INVENTOR.
BERT F. FOWLER
BY
Riley & Watts
ATTORNEYS

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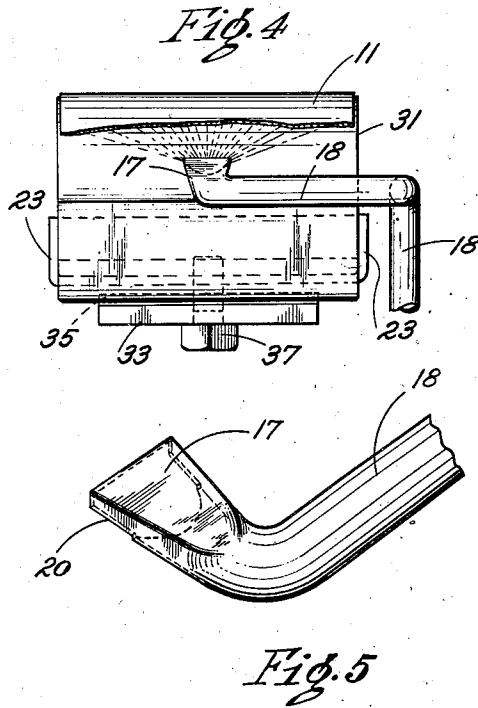
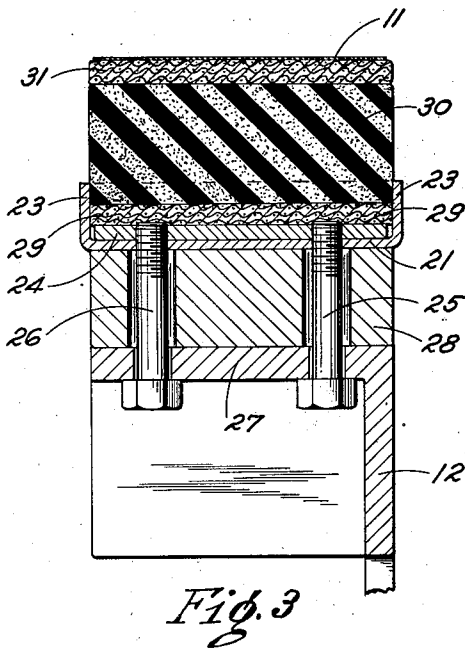
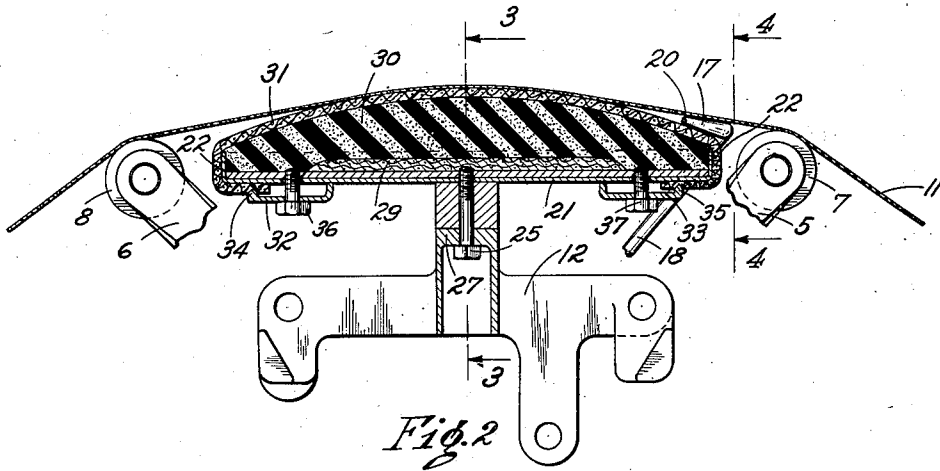
B. F. FOWLER

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2 Sheets-Sheet 2



INVENTOR.
BERT F. FOWLER
BY *Ridley & Watts*
ATTORNEYS

UNITED STATES PATENT OFFICE

2,296,990

BACKING SHOE FOR SURFACE FINISHING APPARATUS

Bert F. Fowler, South Bend, Ind.

Application December 29, 1939, Serial No. 311,468

5 Claims. (Cl. 51-170)

This invention relates to surface finishing apparatus and more particularly to an improved form of backing shoe for use with belt sanding machines.

In my co-pending U. S. Patent applications, Serial Numbers 139,406, now Patent Number 2,199,069, filed April 28, 1937, and 190,254, filed February 12, 1938, I have described and claimed belt sanding devices for finishing surfaces, such as automotive vehicle bodies and the like, and the present invention is described herein in connection with a machine of the general type described and claimed in my said co-pending applications.

In order to obtain a fine surface finish on metal by means of an endless belt sander it is advisable, in certain instances, to provide means for backing the belt to give the proper support thereto when the operator causes the belt to engage the work surface. Furthermore, in high speed production operation, the sanding belt is subjected to very substantial heat which is generated by engagement of the belt with the work. This heat not only may be harmful to the belt itself, but, if permitted to continue without proper dissipation, may damage the backing shoe.

It is among the objects of my present invention to provide an improved backing shoe for sanding machines which will give the desired surface finish and which may be successfully employed with unbacked sanding belts, i. e. abrasive belts used alone without driving or supporting belts. Other objects of my invention are: to provide means for backing up surface finishing belts of the type described and at the same time cooling the belt and shoe surface to prevent damage due to excessive heat; to provide a belt supporting means for sanding machines which will provide the desired resilient belt backing and cooling in a simple, efficient and economical manner; and to provide a rugged backing shoe having a fabric or the like working face which may readily be changed to accommodate different types of work or for replacement due to wear.

The above and other objects of my invention will appear from the following description of a preferred embodiment thereof, reference being had to the accompanying drawings, in which—

Figure 1 is an elevational view of a sanding machine of the general type shown in my co-pending application Serial No. 190,254 equipped with my improved backing shoe.

Figure 2 is a longitudinal cross-sectional view of the shoe and associated parts which are illustrated in Figure 1.

Figure 3 is a transverse cross-sectional view taken on line 3—3 of Figure 2.

Figure 4 is a transverse cross-sectional view taken on line 4—4 of Figure 2 and illustrating the air nozzle.

Figure 5 is a detached view of the air nozzle.

As noted above, the sanding machine illustrated herein is of the general type shown in my said co-pending U. S. patent applications. However, it will be observed by those skilled in the art that my improved shoe structure may readily be adapted for use with other types of surface finishing apparatus. As the particular features of the sanding machine, per se, illustrated in Figure 1 do not form a part of the present invention, only a brief reference will be made to the general layout of the machine in order that a proper understanding may be had of the present invention.

A frame structure 1 carries rotatable belt carrying pulleys 2 and 3, the pulley 3 being driven by a suitable motor 4. Pivoted arms 5 and 6 are mounted on the frame 1 and carry guide rolls 7 and 8 at their outer extremities. Springs 9 and 10 cause the rolls 7 and 8 to be resiliently maintained in the position shown in Figure 1 with the rolls 7 and 8 engaging the sanding belt 11 which encompasses the pulleys 2 and 3.

My improved backing shoe is generally indicated at S in Figure 1 and is carried by a bracket 12 mounted on the frame 1 and adapted to position the shoe S between the arms 5 and 6. The belt 11 travels in the direction of the arrow in Figure 1 and a dust collecting hood is indicated at 13, positioned to catch particles thrown off from the moving belt. The suction fan 14, driven by motor 15, causes air to flow through the hood 13 conveying dust, etc., into the collecting bag 16.

In the illustrated embodiment of my invention the belt 11 is preferably formed with the usual base of fabric or other suitable material coated with an abrasive. No backing belt is employed, as illustrated, and the inner surface of the abrasive belt 11 directly engages the outer surface of the shoe S. In order to reduce the friction between the belt 11 and the shoe S I provide a nozzle 17, formed on the end of a pipe 18, which leads to the valve 19. This valve 19 controls the flow of air through the pipe 18 to the nozzle 17 and it will be understood that a connection will be made from the valve 19 to a suitable source of air under pressure (not shown). As is best seen in Figure 4 the nozzle or jet 17 is positioned centrally of the belt and shoe and is adapted to direct a fan shaped stream of air

between the belt and the shoe adjacent to and ahead of the point of contact therebetween. This air serves to cool the abrasive belt 11 and surface of shoe S and prevents overheating thereof.

As is seen in Figure 5, the outlet of the nozzle 17 consists of a flattened tube having a cut-out portion 20 on its lower side. This opening is positioned closely adjacent to the surface of the shoe S and thus the outlet for air is reduced as compared to the area of the pipe 18. Discharging air under pressure through the orifice 20 results in a fan shaped film of air being directed over the shoe surface and between the belt and shoe. A reduction in temperature of the air so discharged occurs due to the restriction at the outlet and thus a very effective cooling action is obtained. By directing the air in a cooled, fan shaped thin stream adjacent the point of contact of the belt and shoe and in the direction of belt movement, the most effective cooling and cushioning action is obtained.

The shoe S comprises a metal base 21 having upturned end walls 22 and side walls 23. A plate 24 is disposed on the bottom of the pan formed by the base 21 and the walls 22 and 23 and is provided with tapped holes which are engaged by the screws 25 and 26.

As is clearly seen in Figure 3, these screws 25 and 26 extend through the transverse web 27 of the bracket 12 and serve to clamp the members 21 and 24 in position on the machine. A spacer 28 is disposed between the web 27 and the plate 21 and locates the shoe in proper working position.

A forming element 29, of felt or the like, is mounted on the plate 24 but stops short of the ends thereof, as is seen in Figure 2. Superimposed on the felt member 29 is a resilient body 30 preferably of sponge rubber or the like. This element is held in position on the base plate 21 by the overlying belt or strap 31.

I have found that woven fabric belting of the type used for power transmission is particularly effective as a surfacing material for my improved backing shoe. Fine grain fabric belting is employed for metal polishing operations on steel or relatively hard metal where a high finish is desired while coarser grain, relatively soft belting, is preferably employed when the sanding operations are to be carried out on solder or other soft material. However the surface of the fabric belt may be termed "smooth" as distinguished from grooved metal shoe surfaces which have previously been proposed.

The strap 31 is clamped at its ends to the base plate 21 by means of clamps 32 and 33 which are provided with sharpened edges 34 and 35 and are secured to the base of the shoe by screws 36 and 37. When these screws are tightened the sharp edges of the clamps 32 and 33 dig into the ends of the fabric strap 31 and hold it firmly in position. Before clamping in place the strap 31 is preferably pulled tight enough to place the sponge rubber body 30 in compression to a certain degree, thus forming a backing member of the desired firmness. The member 29 assists in supporting and forming the arch shaped contour of the surface of the strap 31 and this contour is such that sufficient room is provided between the end of the shoe S and the belt 11 to accommodate the air nozzle 17.

If it is desired to change the strap 31 on account of wear or to change the character of the finish obtained by the sanding belt 11, it is only

necessary to loosen the clamps 32 and 33 and install a new strap 31 of the desired characteristics. I have found that this shoe structure has extremely long life under high speed production operating conditions. The air jet not only increases the life of the sanding belts but also increases the life of the backing shoe surface and, by providing the cooling effect of the restricted orifice, overheating of the belt and shoe is effectively prevented.

Although I have described the illustrated embodiment of my invention in considerable detail, it will be understood by those skilled in the art that variations and modifications may be made in the specific structural features of my apparatus without departing from the spirit of the invention. I do not, therefore, wish to be limited to the particular forms shown and described herein, but claim as my invention all embodiments thereof coming within the scope of the appended claims.

I claim:

1. In combination in a surface finishing machine of the type described, a surface finishing belt, means for supporting and driving said belt, a backing shoe positioned to engage the inner surface of said belt, said shoe having a relatively thick resilient body overlaid by a strap of relatively thin, smooth surfaced woven fabric material, the outer surface of said woven fabric being in engagement with the inner surface of said surface finishing belt, a nozzle having its outlet positioned adjacent to and ahead of the place of first engagement between said outer smooth surface of said fabric strap and said inner surface of said surface finishing belt, said nozzle being flattened to provide a reduced and elongated orifice adapted to discharge air in fan shaped jet against said belt and strap, and means for conducting air under pressure to said nozzle.

2. In combination in a surface finishing machine of the type described, a surface finishing belt, means for supporting and driving said belt, a backing shoe positioned to engage the inner surface of said belt, said shoe having a relatively thick resilient sponge rubber body overlaid by a strap of relatively thin, smooth surfaced woven fabric material, the outer surface of said woven fabric being in engagement with the inner surface of said surface finishing belt, a nozzle having its outlet positioned between said outer surface of said fabric strap and said inner surface of said surface finishing belt and ahead of but adjacent to the point of contact of said surfaces, said nozzle being adapted to discharge air in the direction of belt travel against said belt and strap, said conduit having a greater cross-sectional area than the outlet of said nozzle whereby a cooling effect is imparted to the air discharged through said outlet, and means for conducting air under pressure to said nozzle.

3. A backing shoe for surface finishing apparatus of the type described including a substantially flat base member having upturned walls, a resilient sponge rubber body supported on said base within said walls and having greater thickness than the height of said walls, a strap of fabric belting overlying said resilient body and secured at each end to said base, said strap retaining said resilient body in compression whereby a curved arch-shaped contour is imparted to the outer surface of said strap.

4. A backing shoe for surface finishing apparatus of the type described including a substantially flat base member having upturned walls,

a forming element disposed on the same side of said base as said upturned walls and extending substantially the full width of said base but stopping short of the ends thereof, a resilient sponge rubber body supported on said base within said walls and having greater thickness than the height of said walls, a strap of fabric belting overlying said resilient body and secured at each end to said base, said strap retaining said resilient body in compression whereby a curved arch-shaped contour is imparted to the outer surface of said strap.

5. In combination in a surface finishing machine of the type described, a surface finishing belt, means for supporting and driving said belt, a backing shoe positioned to engage the inner

5 surface of said belt, said shoe having a relatively thick resilient body overlaid by a relatively thin, smooth surfaced strap of woven fabric material, the outer surface of said woven fabric being in engagement with the inner surface of said surface finishing belt, a nozzle adapted to discharge a fan-shaped jet of air in the direction of movement of said belt and having its outlet positioned adjacent to and ahead of the point where engagement first occurs between said smooth outer surface of said fabric strap and the moving inner surface of said surface finishing belt during rotation of said belt, and means for conducting air under pressure to said nozzle.

BERT F. FOWLER.