

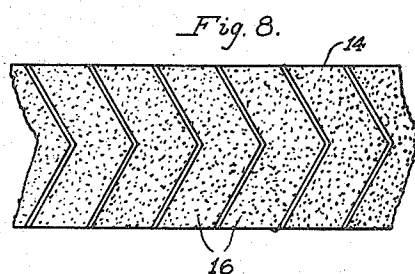
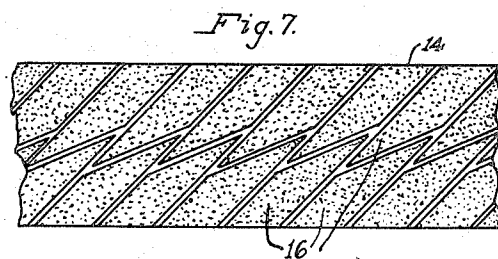
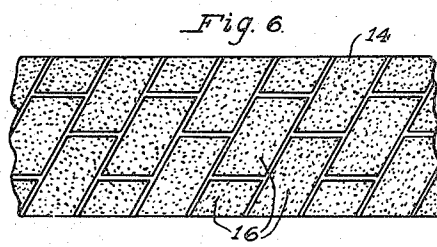
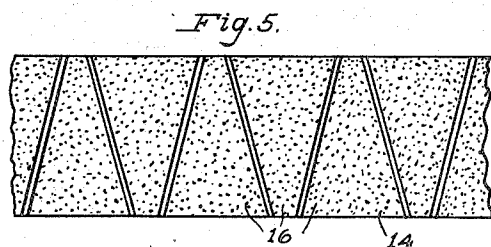
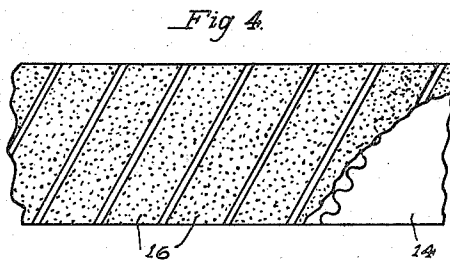
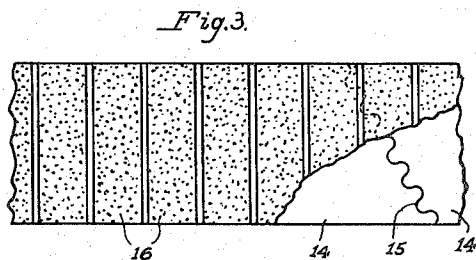
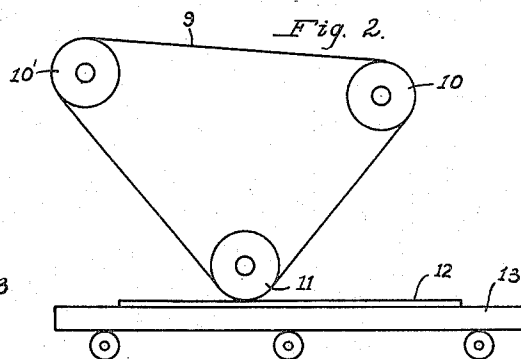
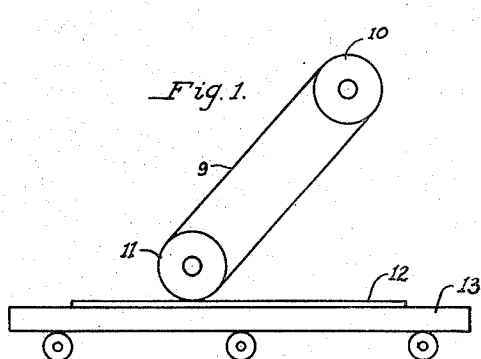
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ABRASIVE BELT

Filed May 21, 1934



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ABRASIVE BELT

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6 Claims. (Cl. 51—188)

This invention relates to abrasive belts and particularly to belts of novel construction adapted for polishing wide sheets of metal.

In preparing abrasive belts, heretofore used in polishing sheet metal, it has been customary to make a paste of adhesive and abrasive grain and smear the same on a heavy continuous backing of canvas or similar material in layers until the desired thickness of abrasive coating has been obtained, after which the finished film is permitted to dry; and it is then ready for use.

The belts produced in this manner have many disadvantages. The production of the paste comprising adhesive and abrasive grain involves the use of a relatively large ratio of adhesive; the abrasive grains are therefore more or less embedded in the adhesive and prevented from having effective contact with the work. The use of the paste also results in an abrasive coating which is hard and cracks easily. Furthermore, because of its dense and continuous nature the abrasive coating receives directly the stresses and strain applied to the belt in use. For example, when a belt passes around a pulley the longitudinal flexing causes the abrasive coating to crack transversely and in passing around a crowned pulley the belt is flexed transversely with the production of longitudinal cracks. Also when the belt is subjected to such stress that it stretches, the abrasive coating exhibits a further tendency to crack. As a result of this cracking of the abrasive surface the latter becomes a mass of small pieces individually adhering to the backing and tending to spall off leaving objectionable voids, shortening the life of the belt and resulting in lower efficiency of the grinding operation and poorer finish. The spalled pieces are rubbed between the belt and the work with the production of objectionable scratches on the work.

The application of the paste is necessarily relatively slow permitting sections of the backing to be of different moisture content causing unequal drying which distorts the belt, resulting in sloppy edges and warping generally, which makes it difficult to keep the belt on the pulley. Furthermore, it is difficult with this method to obtain uniform thickness of the abrasive coating. Uneven application of the coating of material results in uneven drying with attendant cracking and warping as described in connection with uneven moisture content.

It is also difficult to obtain uniform distribution of the abrasive grain in the paste with the result that there is uneven distribution of the

abrasive material over the surface of the belt with deleterious effects on the abrasive characteristics of the belt. Furthermore, uneven application of the paste results in high spots which are also prejudicial to the abrasive quality of the belt.

The improved belt of the present invention overcomes the disadvantages set forth in connection with the belt used heretofore and also possesses characteristics not heretofore found in abrasive belts and is capable of results not heretofore obtainable by means of abrasive belts. The new belt may comprise a liner or backing of suitable material such as "oceanic duck" and a plurality of segments of abrasive coated fabric such as paper or cloth attached to the liner by a suitable adhesive. The segments may be arranged whereby one side of the liner is substantially entirely covered by an abrasive layer and presents a substantially continuous abrasive surface, that is a surface which has the abrading characteristics of a truly continuous abrasive surface.

The arrangement of the segments of fabric may be any convenient one called for by the nature of the material at hand. It is preferable however that the lines of junction between the segments all be substantially diagonal to the longitudinal axis of the liner.

The invention will be further described in connection with the accompanying drawing which is illustrative only; the invention being limited only by the scope of the appended claims.

In the drawing—

Figure 1 illustrates diagrammatically an example of polishing or abrading apparatus for use in connection with which the belt of the present invention is particularly adapted;

Figure 2 illustrates a modification of the apparatus shown in Figure 1; and

Figures 3 to 8 inclusive illustrate various arrangements of segments of abrasive coated fabric on a liner.

Referring to the drawing, the apparatus shown in Figures 1 and 2, for use in connection with which the new belt is particularly adapted, the abrasive belt 9 is shown as supported by pulleys 10 and 11; pulley 11 acting to press the belt 9 into contact with the work sheet 12 which is in turn supported by a reciprocating carrier 13. In the modification shown in Figure 2 an additional overhead pulley 10' is provided.

The liner or backing used is necessarily an endless belt or made substantially so by means of a suitable splice joining the ends of a strip of suit-

able material such as the liner 14, referring to Figures 3 and 4, joined by means of the interlocking splice 15. Referring to Figures 3 to 8 inclusive, segments 16 of abrasive coated fabric may be attached to a side of the liner 14 by suitable application of adhesive material. The segments 16 are preferably laid whereby their edges are adjacent so that they substantially cover an entire side of the liner 14. As shown in Figure 3 the segments may be in the form of rectangles and laid whereby they extend substantially directly across the liner 14. Preferably however, as indicated in the remaining figures, the lines of junction are substantially diagonal to the longitudinal axis of the liner.

The segments may be regular or irregular in size and uniform or varying in shape and size, and various geometrical shapes of segments and arrangement of segments on the liner are illustrated in Figures 3 to 8 inclusive, and these and still other arrangements may be used according to the nature of the material to be polished, the finished surface desired, and the size of the materials at hand for constructing a belt. The arrangement shown in Figure 7 is advantageous in that the irregular shaped segments are symmetrical with respect to the axis of the liner. This arrangement avoids diagonal lines of juncture extending clear across a liner in one direction and tends to assist the centering of the belt on the pulley.

The segments may be arranged and selected whereby all the segments on a liner carry abrasive grains of the same grit size or the abrasive surface may be made up of segments carrying various grit sizes of abrasive material. The segments may also be of uniform or varying hardness of abrasive material and arranged with respect to each other according to the effect desired. The segments need not necessarily be of the same size and the segments carrying finer or softer abrasive grain may be relatively narrow and located between successive wider strips or segments carrying relatively harder or coarser abrasive grain. In such arrangements the smaller segments tend to assist in the polishing operation and also to collect and retain large particles such as grain which has become loosened from the abrasive segments. When such large particles are rubbed between the hard abrasive surface of the segments and the surface to be polished they produce scratches of undue size which mar the surface.

Other means than the softer abrasive segments may be employed to collect and retain such particles. For example, spaces between adjacent segments may be filled with grease or strips of fibrous material of relatively open structure such as felt or similar resilient material and wire brushes or similar material. The use of these substances in the spaces between the segments materially improves the finish of the article being abraded or polished. In connection with the use of these materials, the segments may be arranged close together or they may be spaced apart providing substantial areas for the location of material to collect and retain the loose particles.

When abrasive coated cloth is used to form the segments to be applied to the belt they are preferably cut and laid with respect to the woof and warp of the cloth whereby the threads lie substantially diagonal to the longitudinal axis of the belt. As a result of this arrangement any stress transferred to the segments from the liner and caused by longitudinal stretching of the liner due

to the pressure of the belt on the work or transverse stretching due to passage of the belt over a crowned pulley, will merely cause a slight distortion of the mesh of the threads. The stress on the segments is thereby relieved by the distortion of the mesh of the threads so that no stress is applied along the length of the threads. By means of this arrangement therefore there is less tendency of the threads of the abrasive segments to break and less tendency for the abrasive grain to be dislodged and drop out of place.

The liner is necessarily in the form of an endless belt or made substantially so by means of one or more splices. The liner may consist of any suitable fabric and need not be a unitary piece but may comprise a plurality of portions of similar or dissimilar fabric suitably joined together. For example, the liner may be made up of a layer of paper and a layer of cloth suitably joined together. While such a liner may not be as strong as one composed entirely of cloth if the latter is of the same thickness the composite structure has the advantage of cheapness and it is strong enough for some uses. The liner may also consist of a plurality of segments arranged similarly to the arrangement of abrasive coated fabric described above and joined together to form a suitable belt by any suitable means, for example, by interlocking splices arranged diagonally to the axis of the liner. Furthermore the liner may consist of a plurality of segments of cloth wherein the woof and the warp threads of the cloth are diagonal to the axis of the belt with resulting advantages analogous to those set forth in connection with the use of abrasive coated cloth segments so arranged. A liner made up of a plurality of segments has the further advantage that it can be made in widths greater than those of commercially obtainable cloth.

While the invention has been described with reference to belts to be stretched about a plurality of pulleys, it is evident that it applies also to coverings which are to be set around the periphery of one pulley or drum. When the drum is covered with a layer of felt a continuous liner may not be necessary, that is, the segments of abrasive coated fabric may be laid directly on the belt with only patches underneath to join them at the line of junction. Since the action of an abrasive covered drum is somewhat the same as a belt passing around the pulley the advantages described in connection with a belt will be generally found to be true also in connection with a drum.

The new belt has the advantages, and advances in technical control of abrasive surface, characteristic of the modern methods of manufacture of abrasive coated fabric. By means of the invention belts can be made having the excellence of abrasive surface found only in abrasive coated fabric made by closely controlled scientific methods. For example, the new belt can be made having an exact uniform height of abrasive material; contrary to the situation existing in previous construction of such belt.

The new belt is easier to make since it does not require the application of a coating of adhesive to a large surface. Furthermore, since the abrasive surface can be applied to a new belt with the use of a small amount of adhesive, there will not be puckering or warping of the back with the resulting disadvantages characteristic of warping and puckering. Also the abrasive quality of the belt will be better since the new belt involves the use of a smaller ratio of glue to abrasive material.

In the manufacture of the new belt it is possible to produce on it the type of coating desired and to obtain a uniform application of a coating of the desired nature. For example, if it is desired to produce a relatively open coat of abrasive material on the belt this can be done with a uniform application of abrasive grain in the proper quantity and a minimum and uniform application of adhesive about the grain.

Because of the segmental nature of the abrasive surface on the new belt the longitudinal strains are borne substantially entirely by the backing or liner, since the weakest parts of the new belt are those lying between two segments of abrasive material, consequently any stretching of the belt occurs in the liner in those portions lying between the segments of abrasive material. Those portions stretch sufficiently to relieve the stress and the abrasive segments remain substantially unstretched so that their abrasive qualities are unimpaired and the abrasive surface is not broken up with resultant loss of abrasive grain and poor quality of work as in the case of previous belts. The resilient nature of the liner will cause it to regain substantially its original length and shape after the stress is removed and even if it does not regain its original shape entirely the resulting slight widening of the areas between the abrasive segments will not materially affect the abrasive action of the belt. Since the liner is independent of the abrasive member it can be selected for desired qualities, such as flexibility and resistance to stretching, without regard to its abrasive retaining characteristics. The new belt is therefore more resistant to deformation than the old belt and can be stretched without destroying the abrasive surface. Furthermore the new belt is more able to regain its original shape after removal of the stresses which cause stretching.

The abrasive segments may be made of abrasive coated cloth and may be arranged on the liner whereby the threads are diagonal to the axis of the belt. By means of this arrangement as described above, any stretching or stress which is transferred to the segments from the liner will not break the threads or cause dislodgment of abrasive grains but will merely cause a slight flexing of the mesh of the fabric.

Because of its superior abrasive surface the new belt will produce finishes more quickly because of the sharper cutting action of the abrasive grain. Furthermore the new belt will cut efficiently for a longer time than the belt used heretofore. By means of the new belt it is possible to obtain finishes having a uniformity and a fineness which it was not possible to obtain by the belts used heretofore.

The segments may be applied to the liner so that they can be removed when worn out and replaced by segments of new abrasive fabric. To facilitate this operation the belts may be coated with adhesive which does not dry, thus permitting the removal of the segments but retaining them in place with sufficient strength. These segments can be prepared in advance with such a coating of adhesive with the adhesive surface protected by a strip of fabric which may be torn off when the segment is to be applied exposing the sticky adhesive surface. The abrasive material may be prepared in the form of tape with the adhesive applied to the back thereof and protected by a strip of paper or cloth.

The new belt is easier to make and at the same time has greater efficiency in use. It has been

found, for example, when a belt of previously known construction has been removed from a polishing machine such as that illustrated in Figure 1 and replaced with the new belt of the present invention, that the production of the machine has increased from two to three times that obtained when using the old type of belt.

We claim:

1. An abrasive belt comprising a suitable liner with a surface thereof substantially covered by a plurality of segments of abrasive coated fabric intimately united thereto, the abrasive surface of the belt formed by said segments being longitudinally discontinuous, whereby any longitudinal line on the surface of the belt crosses several junctures between segments.

2. An abrasive belt comprising a suitable liner with a surface thereof substantially covered by a plurality of segments of abrasive coated fabric intimately united thereto, the abrasive surface of the belt formed by said segments being longitudinally discontinuous, whereby any longitudinal line on the surface of the belt crosses several junctures between segments, the said surface being free from longitudinal junctures of substantial length.

3. An abrasive belt comprising a suitable liner with a surface thereof substantially covered by a plurality of parallelogrammic segments of abrasive coated fabric extending across a side of the said liner and intimately united thereto, the abrasive surface of the belt formed by said segments being longitudinally discontinuous, whereby any longitudinal line on the surface of the belt crosses several junctures between segments.

4. An abrasive belt comprising a suitable liner, a plurality of segments of abrasive-coated fabric intimately united to a side of the said liner and spaced apart from each other whereby they present a plurality of discontinuous abrasive surfaces and whereby the said abrasive surface is crossed by a plurality of transverse spaces between adjacent segments, and, located in the space between the said segments, material less abrasive than the said segments and adapted to collect and retain particles which would unduly scratch the surface being abraded.

5. An abrasive belt comprising a suitable liner, a plurality of segments of abrasive-coated fabric intimately united to a side of the said liner and spaced apart from each other whereby they present a plurality of discontinuous abrasive surfaces and whereby the said abrasive surface is crossed by a plurality of transverse spaces between adjacent segments, and, located in the spaces between the said segments, and intimately united to the said liner fibrous material less abrasive than the said segments and of relatively open structure adapted to collect and retain particles which would unduly scratch the surface being abraded.

6. An abrasive belt comprising a suitable liner, a plurality of segments of abrasive-coated fabric intimately united to a side of the said liner and spaced apart from each other whereby they present a plurality of discontinuous abrasive surfaces and whereby the said abrasive surface is crossed by a plurality of transverse spaces between adjacent segments, and, located in the spaces between the said segments, grease-like material adapted to collect and retain particles which would unduly scratch the surface being abraded.

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