

C. E. LUCKE.
METHOD OF SPLITTING SHEET MATERIAL.
APPLICATION FILED JUNE 21, 1915.

1,383,133.

Patented June 28, 1921.

2 SHEETS—SHEET 1.

Fig. 1.

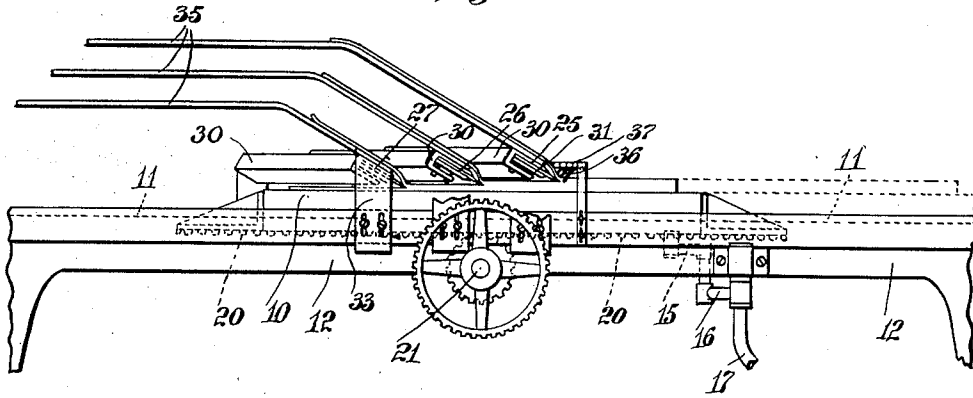


Fig. 2.

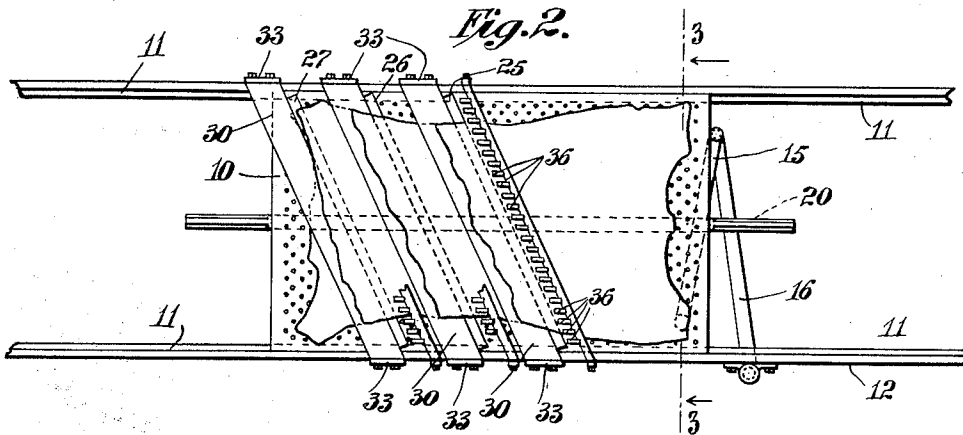


Fig. 3.

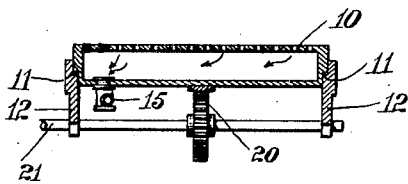
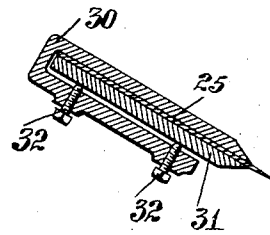


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

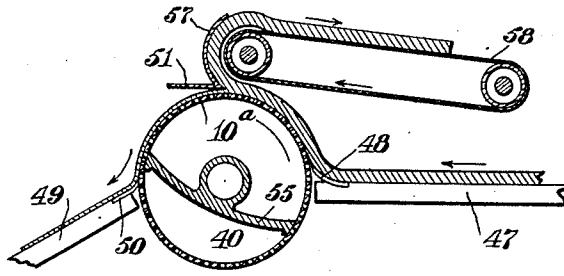


Fig. 6.

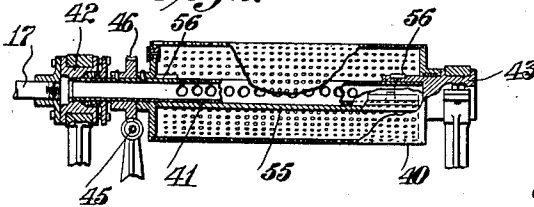


Fig. 7.

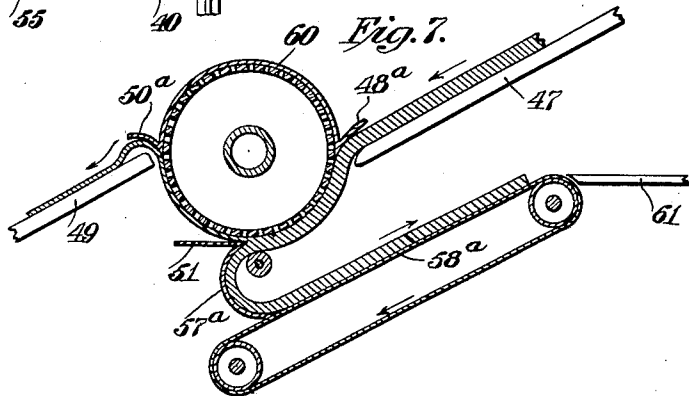


Fig. 9.

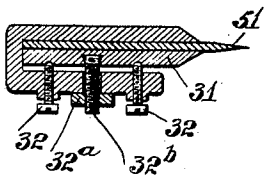
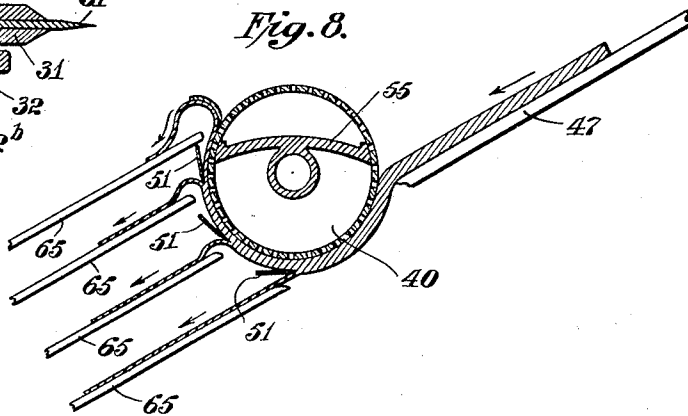


Fig. 8.



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UNITED STATES PATENT OFFICE.

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METHOD OF SPLITTING SHEET MATERIAL.

1,383,133.

Specification of Letters Patent. Patented June 28, 1921.

Application filed June 21, 1915. Serial No. 35,264.

To all whom it may concern:

Be it known that I, CHARLES E. LUCKE, a citizen of the United States, residing at New York city, in the county of New York and State of New York, have invented certain new and useful Improvements in Methods of Splitting Sheet Material, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to the art of splitting sheets of leather or other material, or cutting them into layers or thinner sheets, and the invention comprises a method wherein the sheet of leather or other material to be split is held against a supporting surface or surface of reference by air pressure during the cutting or splitting operation. The invention has been made especially with the idea of providing a method for splitting hides and other sheets of leather into thinner sheets or for skiving or cheeking, or splitting off from a hide or other leather sheet, undesirable surface portions or the surface layer of the thicker portions of a piece or sheet of uneven thickness. The invention is of course not limited in all its features to the splitting of leather, but may be used for splitting sheets of other material to which it may be found adaptable, as for example, cutting, or splitting, off the looped ends or surface portion of velvet or other pile fabric which has a body sufficiently impervious to air to permit it to be held tightly against a suction support.

With the methods and machines heretofore in use for splitting or skiving leather, it is difficult to secure the desired degree of accuracy in the cutting or splitting operation, and the operation of the machines requires great skill on the part of the operators. Even with skilful operators the work done is frequently imperfect, and the result of unskilful operation or of carelessness on the part of the operator is the production of uneven sheets frequently with holes in them and consequent impairment of the value of the leather. The sheets into which the leather is split should of course be of uniform thickness for most purposes. With the methods and machines heretofore employed

more or less uneven splitting has been usual even with high priced operators.

The difficulties met with in the use of the old machines are due to the imperfect means employed for holding the leather during the operation of splitting. In such machines the leather is held by being pressed by mechanical means against a registering roll. Such means for holding the leather necessarily must be spaced off somewhat from the edge of the cutting knife so that the leather sheet is not held directly at the line of cutting. Furthermore, in order to secure an even cutting the holding pressure should be high enough to smooth out all unevenness of the leather, but such high pressure will usually result in an undesirable marking of the leather. And if the leather is materially uneven in thickness, or if it puckers much, the pressure holding means heretofore employed are ineffective.

The object of the present invention is to secure a more accurate splitting with the production of uniform sheets, to reduce waste, and to reduce the necessity for the employment of excessively skilled labor, and generally to provide an improved method for splitting sheets of leather and other material.

A full understanding of the invention can best be given by a detailed description of the construction and operation of apparatus adapted for practising the invention, and such a description will now be given in connection with the accompanying drawings showing an approved form of such apparatus and modifications thereof. In said drawings:

Figure 1 is a longitudinal elevation partly in section of an approved form of apparatus or machine adapted for practising the method;

Fig. 2 is a plan view of the apparatus shown in Fig. 1;

Fig. 3 is a transverse section taken on line 3—3 of Fig. 2;

Fig. 4 is an enlarged detail section through one of the cutting blades and its support;

Fig. 5 is a view partly in section illustrating a modified form of apparatus;

Fig. 6 is a longitudinal section through

the suction cylinder of the apparatus shown in Fig. 5;

Figs. 7 and 8 are views similar to Fig. 5 but showing further modified forms of apparatus; and

Fig. 9 is an enlarged detail section through one of the cutting blades of the apparatus shown by Figs. 5, 7 and 8, and its support.

Referring to the drawings and first to Figs. 1 to 4, the machine shown in these figures comprises a flat or plane surface suction support 10 formed by a perforated or other suitable permeable plate which forms the top wall of a suction box from which connection is made to a suction pump or other suitable exhauster not shown and which is mounted to travel back and forth on ways 11 carried by the supporting frame 12 of the machine. Connection from the suction chamber to the exhausting means in the apparatus shown is by means of jointed pipe sections 15 and 16, the sections being connected by a floating hinge and one section having a hinge connection to the suction box and the other section being pivotally supported from the machine frame and connected to a pipe 17 leading to the suction device.

The suction box may be reciprocated on its way 11 by any suitable means. As shown, the box carries a rack 20 with which engages a gear carried by a shaft 21 mounted in the machine frame and which may be driven from any suitable source of power, suitable starting and stopping and reversing devices being provided for controlling the reciprocating movement of the suction support or table.

Mounted above the suction support with their edges parallel to the surface of the support but extending transversely to the direction of movement of the support are a plurality of knife blades 25, 26 and 27 for cutting successive layers from a hide or other piece of sheet material carried by the support. The knives are mounted with their edges at different distances from the surface of the support, the knife 25 which first engages the material to cut the first layer therefrom being farthest from the support, the knife 26 being set closer to the support to cut a second layer from the material, and the knife 27 being still closer to cut a third layer, leaving a fourth layer to be carried by the support beyond the third knife.

In order to secure a shearing cutting action of the knives without resorting to the use of hand knives or other moving knives, the knives are set with their edges extending at an angle to the normal direction of movement of the suction support. It is possible to have the knives so set since the material being cut is held against the surface of the suction support, or the surface of reference, directly at the line of cutting

as well as before reaching such line or place and after passing same. The knives may be of any suitable form and mounted in any suitable manner, but should best be adjustable relatively to the suction support and also relatively to each other to vary the distance between the cutting edge of each knife and the support, and thereby the thickness of the cut layers or sheets. Most desirably, thin knife blades having straight cutting edges, such as shown, are employed, the blades being mounted each in a blade holder 30 which is of U shape in transverse cross-section as shown in Fig. 4 and in which the knife blade is held against one side of the holder by a plate 31 which is forced into holding position as by clamping screws 32. The holders are supported by end brackets 33, and each is adjustable to vary the distance of the cutting edge of the knife from the surface of the suction support, as by having the brackets secured to the machine frame by screws passing through slots in the brackets as shown in Fig. 1.

Extending upward from each knife holder, is a receiving table 35 for receiving the layer of leather or other material cut off from the sheet on the suction support by the knife from which such table extends. The machine is best provided with means for pressing down lightly on the upper or outer surface of the material just before it reaches the knife edge so as to aid in holding the edge of the material against the support as it comes into engagement with the knife. For this purpose a series of spring, or other yielding, pressing fingers 36 are provided to engage the material just in advance of the edge of the knife 25, such fingers being carried by a bar 37 mounted on end brackets extending upward from the machine frame and preferably adjustable to set the pressing fingers close to or farther from the surface of the suction support, as may be desired. A series of independently acting spring fingers is used instead of a continuous pressing device for the reason that the hides are usually not of uniform thickness, and for efficient action it is necessary that the pressing device shall be capable of accommodating itself to the varying thicknesses of different parts of the hide. Pressing devices are also best provided for pressing the material as it approaches the knives 26 and 27 as shown in Fig. 2, but as the material will here be of uniform thickness it is not necessary that a series of independently acting pressing devices be provided, but a single continuous pressing device such as the roller 38 shown in Fig. 7 may be provided in front of each of the knives 26 and 27 shown in Figs. 1 and 2, the device for each such knife being conveniently supported from the preceding knife holder.

In the operation of the machine, the hide

or other sheet of material to be split is placed on the suction support when it is in the dotted line position indicated at the right in Fig. 1, the hide being smoothed out so that all parts of it will lie flat and close against the support. A suitable degree of vacuum being maintained in the suction box, the suction box is caused to move rapidly toward and beneath the knives with the result that the hide, while held securely against the surface of the support, will be subjected to the action of the several knives successively, and that the knives will each cut off a layer or sheet from the hide leaving the last layer into which the hide is to be split on the support. The layers split off by the knives will pass upward over the knives and on to the several tables 35 from which they may be removed by hand or carried off by suitable conveying means, and the last layer, remaining on the suction support, may be removed therefrom either before the support makes its return movement to its receiving position at the right of Fig. 1, or it may be allowed to remain on the support to be removed after the support has made its return movement. As hides are usually not of uniform thickness throughout, the first knife will cut from such an uneven sheet of material a layer of varying thickness and the layer cut off may even have holes in it or be of less size than the hide or in several separate parts. The hide should, therefore, be placed on the suction support with the hard or grain side against the support. Then the waste or imperfect layer will be taken from the soft or flesh side of the hide and the valuable portion of the hide will be split into perfect layers each of substantially uniform thickness throughout.

Figs. 5 and 6 illustrate a form of apparatus having a cylindrical suction support provided by the peripheral wall of a rotatably mounted cylinder. Apparatus of this form takes up less space than apparatus of the form shown in Figs. 1 to 4, but requires the use of a moving knife in order to secure a shearing cut. As shown in these figures, the permeable plate which forms the suction support and the surface of which is the surface of reference with relation to which the cutting knife is set, is formed by the peripheral wall 10^a of a cylinder 40, the interior of which provides the vacuum chamber. The cylinder may be mounted in any suitable manner to provide for connection with the exhausting means. As shown, the cylinder is provided with a hollow shaft 41 which extends out through the cylinder head at one end of the cylinder and is journaled in a bearing 42, a stuffing box being provided to make a practically air-tight joint about the shaft. At the other end of the cylinder the cylinder head is provided with a sleeve journaled in a bearing piece 43, passage of air

being prevented by suitable packing rings as indicated, and the end of the hollow shaft extends into and has its bearing within the cored-out end of the bearing piece 43. The purpose of this form of bearing will be pointed out hereinafter. The portion of the shaft 41 within the cylinder is formed with intake openings of suitable aggregate capacity, and the suction pipe 17 connects with the hollow shaft 41 through the bearing 42.

The peripheral wall of the cylinder which provides in this apparatus the cylindrical suction support may be of any suitable character, as for example, the perforated metal plate as indicated in the drawings. Any suitable means may be provided for turning the cylinder. As shown, it is turned by means of a shaft 45 which carries a worm meshing with a gear 46 fast to the hollow shaft 41. The material to be supplied is fed to the cylinder from a feeding table 47 at one side of the cylinder having an upturned guiding edge 48 to direct the edge of the sheet upward to the surface of the cylinder, and at a suitable distance beyond the feeding table circumferentially of the cylinder, is a receiving table provided with an upturned guiding edge or stripping blade 50 which extends close to the surface of the cylinder to strip the sheet or layer of the material therefrom and direct it on to the receiving table. Mounted with its edge adjacent to the surface of the cylinder between the feeding and the receiving tables and on the side of the cylinder over which the sheet to be split passes, is a knife 51. As it is most desirable to use a knife having a straight edge, it is necessary that the knife shall be positioned with its edge extending parallel with the axis of the cylinder, and this being so, in order to secure the desired shearing cut, a moving knife is employed which is best an endless band knife such as is now commonly in use in splitting machines of the type in which the sheet material to be split is fed to the knife by being pressed by mechanical means against a registering roll.

The means for driving such band knife forms no part of the present invention and is therefore not shown, but Fig. 9 shows a suitable form of holder for supporting and guiding the band knife where it passes adjacent to the surface of the cylindrical suction support. Such holder is similar to the holder shown in Figs. 1 and 4, being of U-shape in cross section and having a plate 31 between which and one side of the holder the knife is guided, the plate 31 being adjusted and positioned by screws 32 which bear inwardly against it and by nuts 32^a on thread ed studs 32 which extend outward from the plate through the side of the holder. The holder may be adjustably mounted in a manner similar to the holders of the apparatus shown in Figs. 1 to 4 to provide for

setting the edge of the knife closer to or farther away from the surface of the cylinder to vary the thickness of the layer or sheet to be cut from the hide.

5 As only the portion of the perforated wall of the cylinder between the feeding table and discharge table on the side at which the knife is located serves any purpose in the operation of the apparatus, it is desirable to
10 prevent the entrance of air into the suction space within the cylinder through the inactive portions of its surface between the feeding and receiving tables on the side away from the knife. A suitably arranged shield
15 will serve this purpose, and as shown in Figs. 5 and 6 an inner shield or partition plate 55 is provided, the side edges of which extend close against the inner surface of
20 the perforated plate 10^a at opposite sides of the cylinder and the ends of which extend close against the inner surface of the cylinder heads. This shield or partition plate is
hung on the shaft 41 by collars 56 and is held against turning with the cylinder by
25 having the collar 56 at one end keyed to the bearing sleeve 43 as shown in Fig. 6.

In the operation of this form of apparatus, the cylinder being in rotation and a suitable degree of vacuum being maintained within
30 the cylinder, the hide or other sheet of material to be split is advanced to the cylinder from the feeding table 47 and is gripped by the suction and held to the surface of the cylinder as it comes into engagement there-
35 with and is carried by the rotation of the cylinder past the knife 51 which acts to cut or strip the hide into a layer of uniform thickness which passes on with the moving
40 surface of the cylinder and a layer or portion which leaves the cylinder at the knife. The layer which is carried by the cylinder is stripped off therefrom by the stripping blade 50 and is fed on to the receiving table 49.
45 The other portion or layer may go to any suitable receiving device but as shown it is turned upward and backward by a deflector 57 and delivered on to an endless carrier 58 by which it is returned to the feeding table or other place convenient for the operator, so
50 that it may be re-fed to the machine if desired to have another layer split off therefrom. The edge of the shield 55 extends best to a line slightly above the stripping blade 50 as shown so that the suction grip on the
55 layer carried by the cylinder will be killed before the layer reaches the stripping blade.

Fig. 7 illustrates a form of apparatus similar to that shown by Figs. 5 and 6, but here the knife 51 is mounted below the cyl-
60 indier so that the hide or other sheet to be split is passed down about the lower half of the cylinder, and in place of the interior shield or partition 55 an exterior shield 60 is provided extending between the feeding

table 47 and the receiving table 49 close to 65 the surface of the cylinder. A guide 48^a for guiding the hide downward as it advances from the feeding table, and a stripping and deflecting guide 50^a for stripping the split layer carried by the cylinder from the cyl- 70 indier and guiding it on to the table 49 may be formed as part of or carried by the shield 60 as shown. The portion of the sheet which leaves the cylinder at the knife is turned backward by a guide 57^a and guided 75 to an endless carrier 58^a which takes the sheet upward and delivers it on to a table 61. The operation of this form of apparatus is substantially the same as that of Fig. 5. 80

Fig. 8 illustrates a form of apparatus similar to that shown in Fig. 7 but having a plurality of knives 51 arranged about the cylinder at successively greater distances from the place where the sheet is fed to the 85 cylinder and successively closer to the surface of the cylinder, so that successive portions or layers will be cut from the hide by the successive knives, leaving the final layer to be carried by the cylinder past the last 90 knife. A plurality of feeding tables 65 are provided for receiving the several layers into which the sheet is split.

The term "splitting" as used in the claims is intended to have the broad meaning of 95 cutting in a plane parallel or substantially parallel to a surface of the sheet of material being cut, and is not to be confined to the more restricted meaning of dividing a sheet into two or more continuous sheets or layers. 100

What is claimed is:

1. The method of splitting sheet material which comprises holding the material against a supporting surface by suction, and cutting a succession of layers therefrom 105 while so held without releasing the sheet.

2. The method of splitting a sheet of leather, which comprises holding the sheet by suction with its grain side resting flat against the surface of a permeable support, 110 removing the surface portion from the soft side of the sheet while so held on the support to leave a sheet of uniform thickness, and thereafter and while the sheet is so held on the support cutting a layer therefrom by 115 a knife edge positioned with reference to the supporting surface.

3. The method of splitting a sheet of leather which comprises holding the sheet by fluid pressure with its grain side resting 120 evenly against a supporting surface, and while the sheet is so held cutting therefrom in succession a plurality of layers without releasing the said sheet.

4. The method of splitting sheet material 125 which comprises holding the sheet of material against a supporting surface by suction, and while the sheet is so held cutting there-

from a plurality of layers at a single relative traversing movement between the supporting surface and the cutting device.

5 5. The method of splitting a sheet of leather into a plurality of layers which comprises cutting surface portions from the soft side of the sheet and thereafter splitting the sheet into a plurality of layers each of substantially uniform thick-
10 ness throughout, the sheet during the cutting

operations being held by suction with its grain side against a surface of reference.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CHARLES E. LUCKE.

Witnesses:

A. L. KENT,

PAUL H. FRANKE.