No. 731,127. PATENTED JUNE 16, 1903.

W. D. QUIGLEY & J. H. GAY.

SHARPENING DEVICE FOR MOVING KNIFE BLADES.

APPLICATION FILED NOV. 12, 1902

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

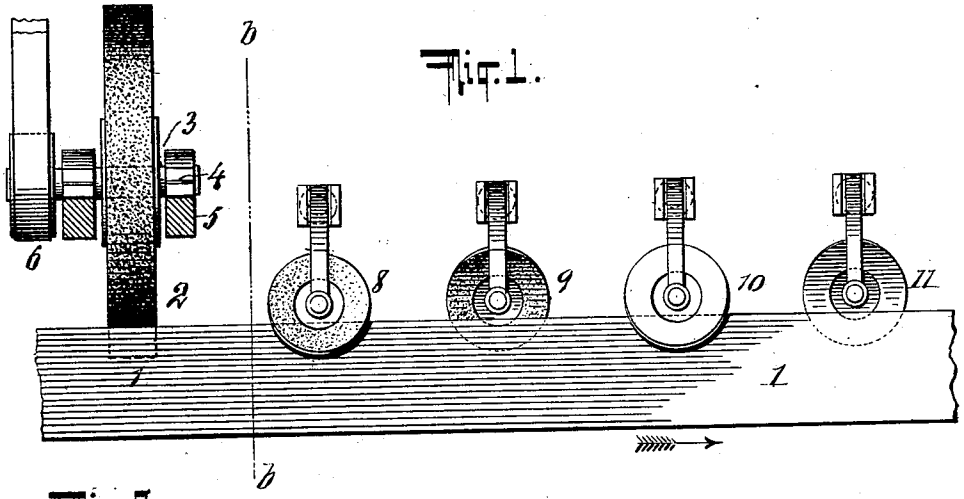


Fig. 2.

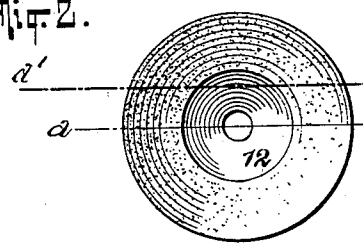


Fig. 3.

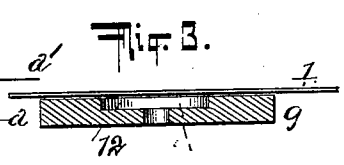


Fig. 4.

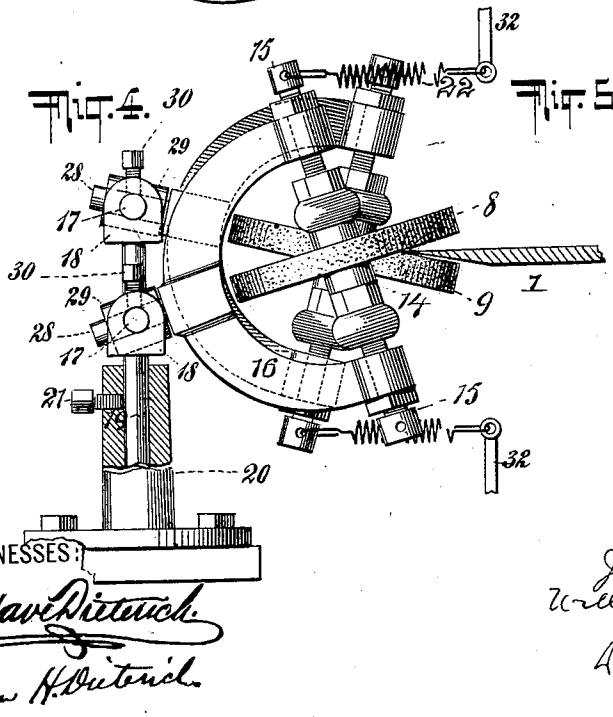
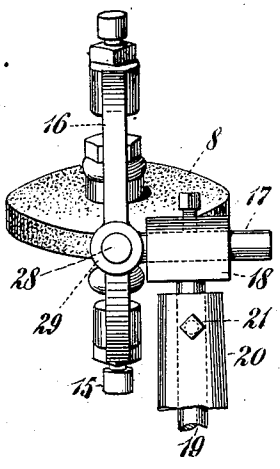


Fig. 5.



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NO MODEL. 3 SHEETS—SHEET 2.

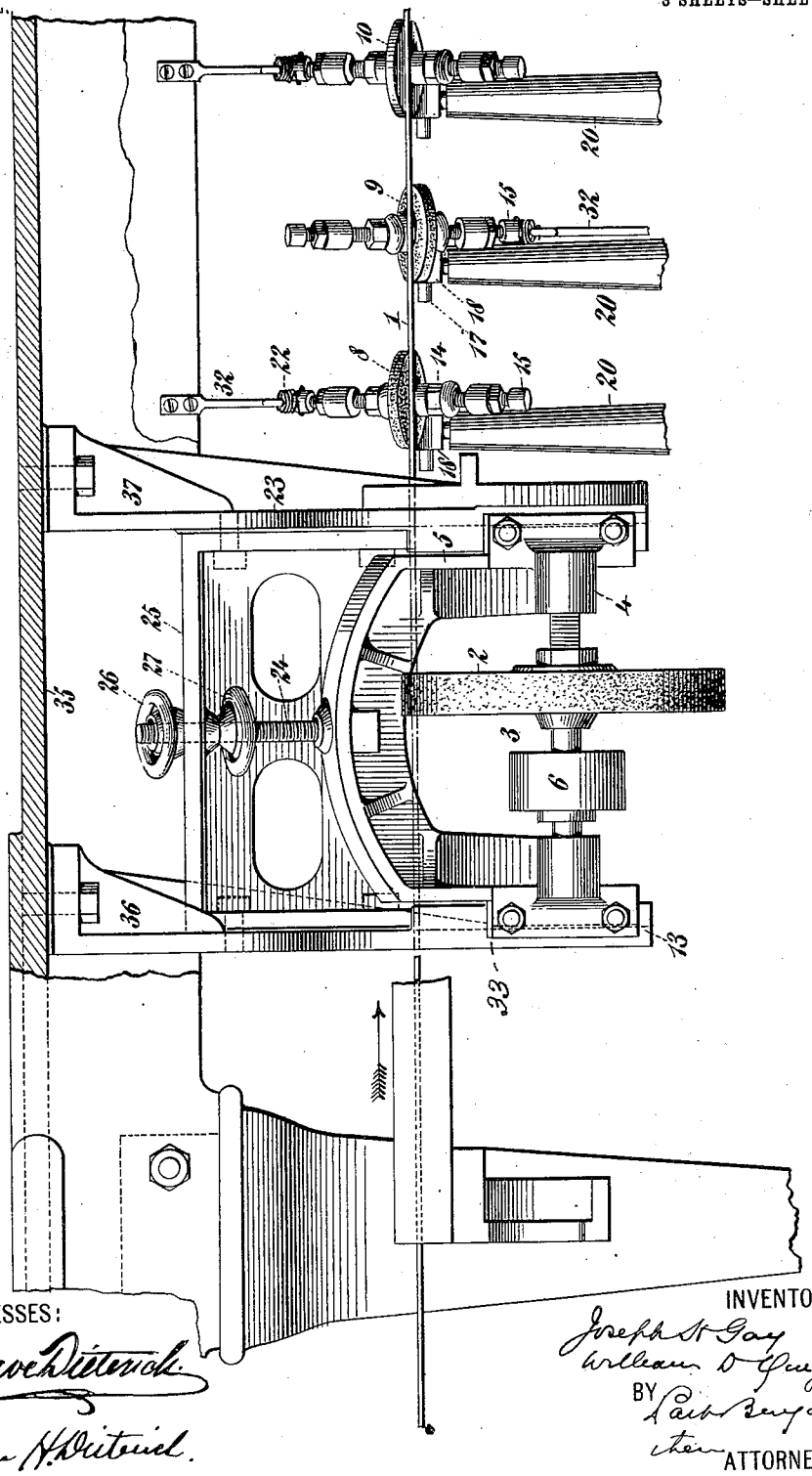


Fig. 5.

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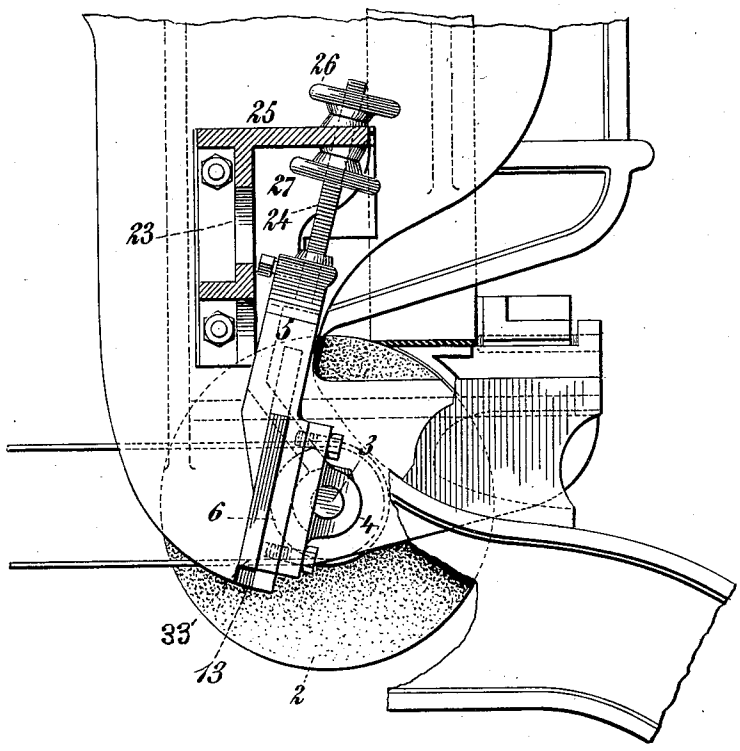
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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 7.



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No. 731,127. Patented June 16, 1903.

UNITED STATES PATENT OFFICE.

WILLIAM DAVID QUIGLEY AND JOSEPH HENRY GAY, OF NEWARK, NEW JERSEY.

SHARPENING DEVICE FOR MOVING KNIFE-BLADES.

SPECIFICATION forming part of Letters Patent No. 731,127, dated June 16, 1903.

Application filed November 12, 1902. Serial No. 130,994. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM DAVID QUIGLEY and JOSEPH HENRY GAY, citizens of the United States, and residents of Newark, Essex county, New Jersey, have invented a new and useful Improvement in Sharpening Devices for Moving Knife-Blades, of which the following is a specification.

The invention relates to sharpening devices for longitudinally-moving knife-blades, and more especially for the moving band-knife blades of a leather-splitting machine.

The invention consists in the construction and arrangement of the sharpening devices, as more particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a partial plan view showing the grinding-wheel and whets in their relation to the knife. Fig. 2 is a face view of one of the whets. Fig. 3 is a section on the line *a a* of Fig. 2. Fig. 4 is a side elevation of a whet and its supports, showing also the next adjacent whet. Fig. 5 is a rear elevation of whet and support. Fig. 6 is a front view of the lower portion of a leather-splitting machine, showing the grinding-wheel and whets in position. Fig. 7 is a side elevation of the grinding-wheel, with its supporting parts in the machine, portions being broken away.

Similar numbers of reference indicate like parts.

What we do by the invention is to sharpen the endless moving band-knife of a leather-splitting machine better and make it last longer than has hitherto, so far as we know, been accomplished. Our principle is this: first to produce on the knife a beveled edge and then to whet that edge by a body or bodies of suitable material, which bodies are in delicate frictional contact with the edge so produced.

In a leather-splitting machine the knife is subjected to a degree of wear which ordinarily soon determines its effective lifetime. It is therefore necessary constantly to sharpen it while it is in use, the blade after acting on the hide being itself acted upon by suitable grinding devices as it moves over its endless path. To this end grinding disks or wheels have been used, sometimes a single rotary wheel operating on one side of the blade, sometimes two such wheels disposed opposite one another and each acting on one side of the blade. Where such grinding-wheels are employed, it is not practicable to produce a fine true edge and to maintain it under the ordinary conditions of hide-splitting. The edge is always more or less rough, and the constant positive abrasion speedily reduces the blade to a width which renders it no longer useful in the machine. Furthermore, by such means an elongated or finely-tapering bevel cannot be produced. The taper is always, relatively speaking, blunt. On the other hand, it is of great importance to make the bevel long and gradual, because this permits of the thin edge being brought into position between the rolls nearest to the line of greatest compression of the hide. The farther away the edge has to be set from this line of maximum compression the less the accuracy and smoothness of the cut, and, correspondingly, the less the efficiency of the machine, because the hide if free between that line of compression and the knife-edge is apt to buckle slightly or be more or less unevenly or irregularly presented to the knife. The consequence is that it is not evenly and smoothly cut, and ultimately the percentage of smooth split surfaces obtainable from a given hide, as well as the number of splits possible, become reduced. To illustrate this: With a single positively-rotating grinding-disk acting on a knife-blade three and one-half inches in width we find that in the space of three weeks' continuous use the blade becomes ground down to a width of one and one-half inches, when it is useless. If two grinding-wheels are employed, acting on opposite sides of the blade, this period is reduced to one week. Now by means of our invention we find that we can run a blade of the above initial width for a period which seems to be limited only by the physical characteristics of the steel of which it is made—that is to say, the steel will crystallize and break before it will become reduced to a width of one and one-half inches. With such knives as we have used, the best we have been able to obtain, we have achieved continuous running of two and one-half months before crys-

tallization and breakage took place, and then the width of one and one-half inches had not nearly been reached.

Referring to the drawings, 1 represents a portion of an endless band-knife blade, which by any suitable means is moved in the direction of the arrow, Fig. 1.

2 is a grinding-wheel, of emery or other suitable abrasive material, which is supported and adjusted by the means hereinafter described to produce a bevel on the under side of the blade 1.

8, 9, 10, and 11 are disk-shaped whets supported, as hereinafter explained, so as to act upon the edge of the blade after it has left the grinding-wheel 2. These disks, as shown, are placed alternately on opposite sides of the blade. When four disks are employed, those (8 and 9) which the blade first meets after leaving the wheel 2 are preferably of Scotch gray stone. The others (10 and 11) are of hard steel and are more strictly burnishers for the edge after it has been fined down by the stones.

The grinding-wheel 2 is preferably not kept in continuous contact with the blade. It may be used in the first instance to produce the bevel and then moved out of abrasive contact. Occasionally as circumstances may require it may be moved back into contact to restore the bevel. It is arranged and supported so as to be used as the judgment of the operator may decide. He can keep it in constant operation or bring it into action intermittently.

The whets (by which we mean the disks 8 9 10 11) are in constant operation—that is to say, they are so supported as that a face of each one of them will lie against the blade and be held there with an elastic or yielding pressure, so that each disk will independently accommodate itself to any small variations in the blade passing over it.

Referring to Fig. 6, 36 and 37 are brackets bolted on the under side of the table 35 of the leather-splitting machine. Between said brackets extends the frame 25. At the lower inner portions of said brackets are elongated guide-channels 13, Fig. 7, to receive ribs 33 on the frame 5. Said frame is supported by the screw 24, which is provided with adjusting-nuts 26 and 27 above and below the upper member of frame 25. On the front side of frame 5 are bolted journal-boxes 4 for the shaft 3, and said shaft carries the grinding-wheel 2. The wheel 2 is adjusted against the blade 1 to grind the bevel by means of the screw 24, its position being then as in Fig. 7, and it is rotated by the belt on driving-pulley 6, which belt leads from any suitable motor. Also by means of the screw 24 the grinding-wheel 2 may be moved to and from the knife-blade 1 or retained in desired position. It will be observed that the axis of rotation of the wheel 2 is by reason of the inclination of the ways 13 in a plane substantially at right angles to the plane of the bevel produced by the circumferential edge of the wheel, so that a bevel of uniform inclination is always produced by the wheel upon the knife when in abrasive contact therewith. Preferably by the aforesaid means the operator moves the wheel into and out of contact with the knife, as already described, in order to produce the bevel originally or to renew it from time to time; but we do not limit ourselves to this particular mode of supporting and adjusting the wheel, first, because any other means of supporting it or adjusting it to accomplish the same end is within our invention, and, second, because this particular arrangement of supporting and adjusting devices for the wheel is fully described and claimed by us in another application for Letters Patent, Serial No. 130,993, filed November 12, 1902.

Each of the whets 8 9 10 11 is supported in the following manner: Each whet is preferably circular in form and supported upon a central shaft 14. Said shaft is in turn supported between two set-screws 15 in a yoke 16. The yoke 16 has at its middle portion a fixed arm 28, which is received in a sleeve 29 at the end of a rod 17, Fig. 5. This yoke is thus free to pivot on said arm 28 in said sleeve. The rod 17 is received and slides in a bearing 18, which is carried on the upper end of the vertical rod 19. Rod 19 slides in the standard 20. The set-screw 21 serves to hold the rod 19 in any desired position in the standard 20, and the set-screw 30 may be used, if desired, to clamp the rod 17 in the bearing 18. Attached, preferably, to the upper screw 15 is a helical spring 22, the other end of which is secured to a vertical fixed arm 32, depending from the table 35 of the machine or rising from the floor, as represented in Fig. 6, or to any other convenient fixed abutment. One face of each whet bears against the knife-edge with a light pressure, regulated by the tension of the spring 22. Consequently whenever any variation in the blade operates to move the whet around the axis of the rod 17 the whet is free to yield. So, also, if any variation tends to tilt it and the axis of the arm 28 this arm turning freely in the sleeve 29 allows it so to do. Thus each whet is supported so as to have a universal movement impressed on it by the blade, whereby it yields to any variation in the latter. When for any reason it be desired to prevent the movement of the whet around the axis of rod 17, the clamping-screw 30 may be tightened; but normally it is to be left free. By the screws 15 the whet may be accurately adjusted nearer to or farther from the blade after its position has been primarily adjusted by raising or lowering the rod 19 in the standard 20.

Referring to Figs. 2 and 3, in each whet there is formed a circular depressed portion 12, over which the knife-edge (indicated by the line $a' a'$ in Fig. 2) extends. If this depression were not provided, the edge of the blade operating to rotate the disk on its pivot would

form a circular shoulder on the flat face of the disk and concentric therewith, which would be tangent to the edge and would constantly dull it. The formation of the depression prevents this.

The operation of the whole device is as follows: The blade 1 being moved in the direction of the arrow, Fig. 1, the grinding-wheel 2 is rotated by the belt and pulley 6 to form the desired bevel. Then the edge is whetted first by the stone whets 8 and 9 and afterward by the steel whets 10 and 11.

The term "grinding device" as herein used means an emery-wheel or similar appliance capable of being moved into contact with the knife-blade and when in such contact actuated by external means positively to abrade the material of the blade. The term "whet" or "whetting device" as herein used means a body of stone, steel, or other suitable material, over which body the blade is movable or moves, so that the edge only of the blade is sharpened by its own attrition upon the whetting-surface.

We claim—

1. The combination with a movable knife-blade of a positively-rotated grinder constructed and arranged to produce a bevel on said blade, a plurality of whets free to be rotated by said blade, and stationary supports for said whets; the said whets being in contact with and operating alternately on opposite sides of said blade to sharpen the edge of the bevel produced by the grinder.

2. In combination with a movable knife-blade, a stationary support, a whet on said support free to be rotated by said blade, a universal joint connecting said whet to said support and means for holding the working face of said whet in elastic contact with said blade.

3. In combination with a movable knife-blade, a stationary support, a whet on said support free to be rotated by said blade, and a universal joint connecting said whet to said support.

4. In combination with a movable knife-blade, a grinding device for said blade, a universal-joint support for said device, and means for holding the working face of said device in elastic contact with said blade.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

WILLIAM DAVID QUIGLEY.
JOSEPH HENRY GAY.

Witnesses:
I. A. VAN WART,
WM. H. SIEGMAN.