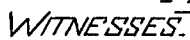


**1,035,445.**

2 SHEETS—SHEET 1.



INVENTOR\_

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EDGE SETTING MACHINE.  
APPLICATION FILED MAR. 6, 1908.

Patented Aug. 13, 1912.  
2 SHEETS—SHEET 2.

1,035,445.

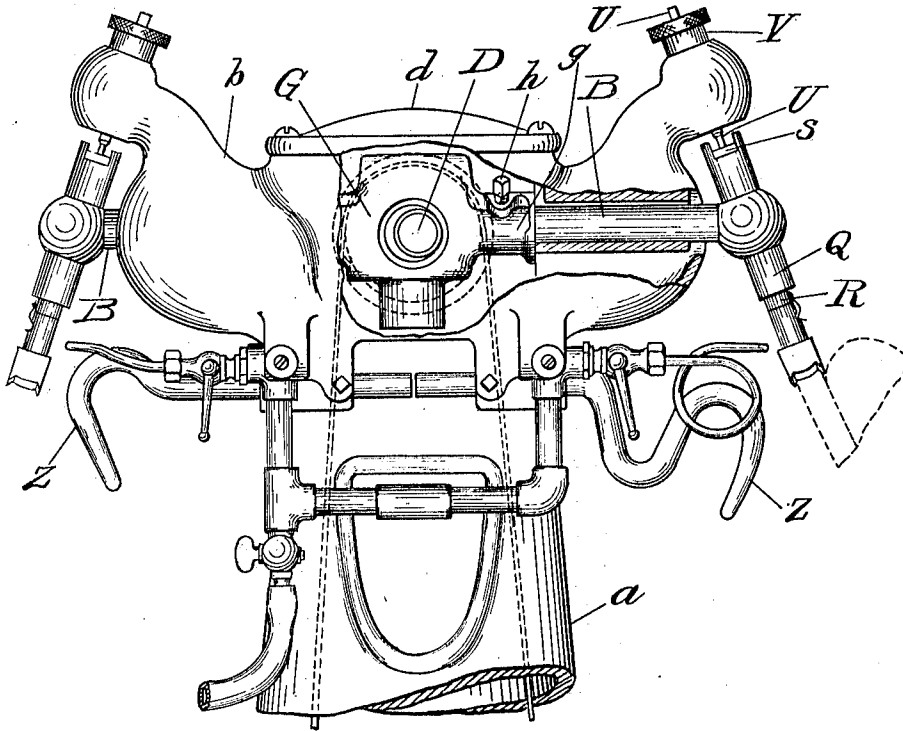


Fig. 4.

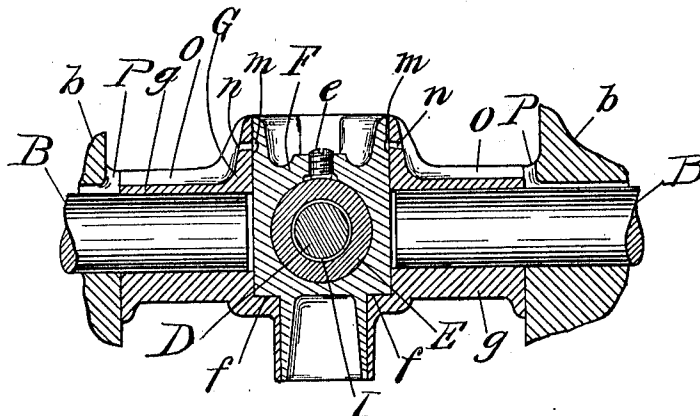


Fig. 5.

WITNESSES.

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# UNITED STATES PATENT OFFICE.

ARTHUR ERNEST JERRAM, OF LEICESTER, ENGLAND, ASSIGNOR TO UNITED SHOE MACHINERY COMPANY, OF PATERSON, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## EDGE-SETTING MACHINE.

1,035,445.

Specification of Letters Patent.

Patented Aug. 13, 1912.

Application filed March 6, 1906. Serial No. 304,484.

*To all whom it may concern:*

Be it known that I, ARTHUR ERNEST JERRAM, a subject of the King of Great Britain, residing at Leicester, in the county of Leicester, England, have invented certain Improvements in Edge-Setting Machines, of which the following description, in connection with the accompanying drawings, is a specification, like reference characters on the drawings indicating like parts in the several figures.

This invention relates primarily to machines for setting and burnishing the edges of shoe soles, and pertains more particularly to that type of machine wherein an edge setting tool is mounted in an oscillating holder. In machines of this type it is desirable that the edge setting tool be rapidly oscillated or reciprocated so that the fiber of a sole edge may be firmly set and burnished to present a relatively hard polished surface.

In machines heretofore used the high speeds of vibration desired for the edge setting tools necessitated correspondingly great speeds of vibration of actuating elements; and this involved destructive wear on the machines which was likely soon to impair their effectiveness and to cause considerable noise in operation.

It is the principal object of this invention to provide an edge setting machine which shall be capable of operating with minimum noise and without material improper vibration and consequent wear.

The novel mechanism by which this object is attained is differentiated from any machine of a type heretofore used, mainly by the fact that in the operation of the latter some element was necessarily subjected to a considerable linear strain of at least momentary duration for the purpose of initiating or maintaining the movement of a driven element of the machine; while the operation of mechanism embodying this invention is characterized by the translation of rotary motion into oscillatory motion through transmission means which coast through sliding friction alone or by means of a uniformly distributed thrust without at any time involving any considerable linear strain. It has been a common expedient, in machines used prior to this invention, to employ a driven eccentric pin connected by a link or otherwise with a lever which was desired to be rocked about its fulcrum. Fre-

quently an eccentric pin has been arranged to project into a slot in the lever which was desired to be oscillated. While it may be said that such an eccentric pin and the link or lever with which it is associated, coast immediately through friction, as by the one sliding relatively to the other, it is nevertheless true that the pin acts positively to move the link or lever through a direct thrust and not through sliding friction alone which involves no linear strain. In this connection an important feature of this invention consists of a rotating driving-shaft, a driven-shaft, and transmission means intermediate said shafts which coast through sliding friction alone or by means of a uniformly distributed thrust to translate the rotary motion of the driving-shaft into oscillatory motion of the driven-shaft.

A more specific feature of the invention consists in a rotating driving-shaft, a driven-shaft, and transmission means which coast through sliding friction of co-axial surfaces to translate the rotary motion of the driving-shaft into oscillatory motion of the driven-shaft.

Other features of the invention will be described hereinafter and will be defined in the claims.

Certain terms used herein may well be defined to avoid confusion or misinterpretation. The word "vibration" is used to include both oscillation along a curvilinear path and reciprocation along a rectilinear path. The expression "exaxial member" will be employed to designate a rotating element having a normal axis non-coincident with the axis upon which it rotates. The expression "edge setting tool" is intended to include shank tools, forepart tools, and all tools of analogous character which perform their function while undergoing rapid vibration; and likewise, "edge setting machine" is intended to include any or all machines whereby such a tool is given its desired operation.

The specific embodiment of this invention shown in the accompanying drawings comprises a driving-shaft and two pairs of co-axial tool-carrying shafts, the axes of said pairs being parallel, and perpendicular to the axis of the driving-shaft. The driving-shaft is constantly rotated during the operation of the machine and its rotary motion is translated, by transmission devices here-

inafter described, into oscillatory motion of the tool-carrying shafts. A tool is mounted in a holder suitably connected to each tool-carrying shaft. Nothing herein contained is to be construed as limiting this invention in its application to use in connection with the specific mechanism shown in the drawings, or in connection with mechanisms of the same type.

In the drawings: Figure 1 is a plan view, partly in section, of a preferred embodiment of the invention. Fig. 2 is a detail vertical section on the line 2—2 of Fig. 1. Fig. 3 is a detail section on the line 3—3 of Fig. 1. Fig. 4 is an end elevation, partly in section, of the machine shown in Fig. 1. Fig. 5 is an enlarged detail vertical section on the line 5—5 of Fig. 1. Fig. 6 is a detail section on the line 6—6 of Fig. 1.

The specific mechanism shown in the drawings comprises a driving-shaft A, a pair of co-axial tool-carrying driven-shafts B B and a second pair of co-axial tool-carrying driven-shafts C C. The frame of the machine consists of a standard *a* supporting a head *b* which includes a chamber *c* inclosing the actuating mechanism of the machine. A removable cover *d* completes the closure of the chamber.

The pairs of tool-carrying shafts B B, and C C are preferably exactly alike as regards both their associated parts and their connection with the driving-shaft A; consequently it will suffice to describe in detail one pair of shafts B B in connection with the means for actuating them.

The shaft A is constantly rotated at a high speed and constitutes the driving element of the mechanism. This shaft may be supported conveniently by the tool-carrying shafts B B as hereinafter described. The shafts B B, constituting the driven elements of the mechanism, are journaled in axial alinement in the head *b* of the machine. Preferably the axis of shaft A intersects that of the shafts B B. The transmission devices for converting the uniform rotary motion of the driving-shaft A into oscillatory motion of the shafts B B, comprise an exaxial member D, a sleeve E surrounding said exaxial member, a swivel-block F rigid with said sleeve, and a hub G connecting the tool-carrying shafts B B. The first step in the translation of the rotary motion of the driving-shaft A is accomplished by means of the exaxial member D. In the preferred form shown in the accompanying drawings this exaxial member D consists of a cylindrical portion of the shaft A, the normal axis of which is oblique to the axis of the shaft A and intersects the latter at its point of intersection with the common axis of the tool-carrying shafts B B (see Fig. 1). Being thus exaxially disposed on the shaft A said member D is

caused to gyrate, as the shaft rotates, in such a manner that the normal axis of said member D generates a double cone. The gyration just described is communicated by the exaxial member D to the sleeve E. Preferably this sleeve encircles the exaxial member D throughout its entire length. The sleeve E fits in an aperture in the swivel-block F and is maintained rigid therein by means of a set screw *e*. In this manner the swivel-block F is caused to gyrate in consonance with the exaxial member D. The swivel-block F is supported within the hub G in such a manner that the former is rotatable, relatively to said hub, about an axis which is transverse to the normal axis of the exaxial member D. The swivel-block is supported in said hub by shoulders *f* of the hub (see Fig. 2). The hub G has laterally extending portions *g* which embrace the adjacent ends of tool-carrying shafts B B and are rigidly secured to the latter by means of set screws *h* (see Fig. 4). It will be noted that the translation of the rotary motion of driving-shaft A is effected, in the first instance, through the coaction of two co-axial surfaces, *i. e.* the surface of the exaxial portion D and the inner surface of the sleeve E. The second step in this translation is effected also through the coaction of two co-axial surfaces, *i. e.* the outer surface of the swivel-block F and the adjacent inner surface of the hub G. The axes about which these surfaces move have preferably a common point of intersection of constant position which is coincident with the intersection of the driving-shaft axis with the common axis of the tool-carrying shafts.

With the arrangement just described the swivel-block F is given a characteristic movement which may be resolved into two components; the first component being movement in a plane parallel to the axis of the tool-carrying shafts, which serves merely to rotate the swivel-block back and forth in the hub G; the second component being movement in a plane perpendicular to the axis of the tool-carrying shafts, which is effective to oscillate the tool-carrying shafts through the agency of the hub G.

The transmission devices just described as associating the driving-shaft A with the tool-carrying shafts B B are preferably duplicated at the opposite end of the shaft A for connecting the latter with the tool-carrying shafts C C. It is desirable that these two sets of transmission devices be disposed symmetrically with regard to a belt-pulley *i* (see Figs. 1 and 4) through which power is conveniently applied for rotating the shaft A. When the parts are thus disposed the reaction of respective pieces of work operated upon simultaneously at opposite ends of the shaft A, balance in the vicinity of the belt-pulley and substantially

negative each other as to any possible torsional effect on the shaft and parts connected to it. Preferably the shaft A has no bearings other than the journals constituted by the exaxial members D D and the sleeves E E at its opposite ends, said sleeves being supported by the swivel-blocks F F and hubs G G, which in turn are carried respectively by the shafts B B and C C.

In order that the above-described mechanism may operate most effectively it is important that the frictional bearing surfaces already referred to be constantly and thoroughly lubricated. To this end the present invention contemplates a system of lubrication which contributes very materially to the successful operation of the mechanism at any desired speed. The chamber *c* preferably contains a quantity of oil. The oil may be elevated to the driving-shaft A in any convenient manner (as by being carried upwardly by an endless chain encircling the shaft—see Figs. 1, 2 and 6) and is delivered primarily at a point contiguous to the exaxial member D. Here the oil enters one or more spiral grooves H in the surface of the exaxial member, and is pumped lengthwise of the latter by said groove. During the progress of the oil the coating surfaces of the exaxial member D and the sleeve E are thoroughly lubricated. When the oil reaches the vicinity of the middle portion of the exaxial member D it is delivered into an annular chamber I formed by reducing said exaxial member at this point. Thence the oil, in part, is thrown upwardly and downwardly by centrifugal force, and the remainder of the oil progresses onwardly through the grooves H H to the end of the exaxial portion D where it finally escapes and rejoins the oil in the chamber. Oil is thrown upwardly at the middle portion of the exaxial member D through apertures J J in the sleeve E into a chamber K and thence through conduits L L in the swivel-block F. These conduits terminate at the outer surface of the swivel-block and serve to introduce oil between the coating surfaces of the latter and the hub G. A number of the conduits L L communicate with the chamber K. The outer extremities of these conduits L L are connected by a groove *m* which encircles the swivel-block F. Communicating with this groove *m* are two diametrically opposite apertures *n n* which extend through the hub G and open into channels O O. Oil is thrown by centrifugal force through the apertures *n n* and thereupon enters the channels O O which incline downwardly toward apertures P P. The apertures P P are contained in the head of the machine near the bearings for the shafts B B (see Fig. 5), and they conduct the oil into channels running lengthwise of said shafts. Here the oil lubricates the shaft

bearings until it finally escapes at the outer end of said bearings and returns to the chamber *c*. Oil is thrown downwardly from the chamber I through conduits J' J' to lubricate the lower coating surfaces of the swivel-block F and hub G. In this manner all of the bearing surfaces of the actuating mechanism are constantly and thoroughly lubricated thereby not only increasing the effectiveness and accuracy of operation of the machine, but also obviating in very large degree the noise and chattering frequently caused by rapidly moving parts.

By way of illustrating a preferred form of tool-holder the present drawings show a holder Q angularly supported in the end of each tool-carrying shaft. The holder comprises a cylindrical sleeve rigid with the tool-carrying shaft which contains the tool shank R axially movable in the holder Q. The downward movement of the tool shank R is limited by a projecting portion S which overlies the upper end of the holder Q. The tool shank R contains a cylindrical recess T extending from its upper extremity to its middle portion. The floor of the recess T is preferably a curved surface having its lowermost point (when a tool shank is at the limit of its downward movement) positioned in the axis of the tool-carrying shaft. Thus it will be seen that as the tool-carrying shaft oscillates the bottom of the recess T will experience very slight, if any, motion. The lower end of a ball-ended strut U projects into the aperture T, its ball-end abutting against the bottom of the aperture. Said strut U is coaxial with the tool shank. The upper end of the strut U projects through a socket V carried in a projecting arm of the head *b* of the machine. This socket contains a spiral spring W which bears downwardly upon a washer X. A block Y, preferably integral with the strut U, abuts against the under face of the washer X. Obviously when a tool, attached at the lower end of the shank R, is in operation it will be permitted to yield against the tension of the spring W, and the varying stresses occasioned by this yielding will be supported entirely by the frame of the machine and not by any normally moving part.

It is desired herein expressly to disclaim the invention embodied in the tool holder and yielding devices just described.

The mechanism shown in the drawings preferably includes gas jets for heating the edge setting tools, and hand rests *z* shown in Fig. 4.

The specific mechanism shown in the drawings may be changed in many ways. The sets of tool-carrying shafts and transmission devices above described may be indefinitely re-duplicated; or, if desired, a machine may have but a single set, or a single tool-carrying shaft. While it is pref-

erable that the axes, about which the elements of the mechanism move, have a common point of intersection this is by no means essential. Nor is it essential that the tool-carrying shafts be co-axial. Though the shaft A is shown as supported by a swivel-block upheld by two driven shafts, it might be similarly supported by a bearing upheld by a single shaft. Any desired sort of tool holder may be used in connection with a tool-carrying shaft, and a tool mounted therein may be arranged to oscillate in a curvilinear path or to reciprocate in a rectilinear path. All such changes as are here suggested and many others which will appear to those skilled in the art are to be construed as included within the proper scope of this invention as it is defined in the subjoined claims.

Having described my invention, what I claim as new and desire to secure by Letters Patent of the United States is:—

1. An edge setting machine comprising, in combination, a rotating driving shaft, a driven shaft, a tool operatively connected with said driven shaft, and transmission means intermediate said shafts which coast through sliding friction to translate the rotary motion of the driving shaft into oscillatory motion of the driven shaft, said driving shaft, driven shaft and transmission means having intersecting axes.

2. An edge setting machine comprising, in combination, a rotary driving shaft, a driven shaft, transmission means intermediate said shafts which coast through sliding friction to transmit the rotary motion of the driving shaft into oscillatory motion of the driven shaft, said driving shaft, driven shaft and transmission means having axes which intersect at a common point, and a tool operated by said driven shaft.

3. An edge setting machine comprising, in combination, a rotating driving shaft and a driven shaft having intersecting axes, together with transmission devices intermediate said shafts which coast through sliding friction to translate the rotary motion of the driving shaft into oscillatory motion of the driven shaft, the transmission devices having axes which intersect the axes of the driving and driven shafts, and a tool operatively connected with the driven shaft.

4. An edge setting machine comprising, in combination, a rotating driving shaft, a driven shaft, transmission means intermediate said shafts arranged to coast through friction surfaces which have relative movement about a plurality of axes all of which intersect at a common point, and a tool operated by the driven shaft.

5. An edge setting machine comprising, in combination, a rotating driving shaft, a driven shaft, a tool operated by the driven shaft and transmission means intermediate

said shafts comprising a swivel block, means actuated by the driving shaft for gyrating the swivel block about two axes and means for communicating the gyration of the swivel block about one axis to the driven shaft for oscillating the latter, the axes of the driving shaft, driven shaft and the swivel block intersecting at a common point.

6. An edge setting machine comprising, in combination, a rotating driving shaft, a driven shaft, a tool operated from the driven shaft and transmission means intermediate said shafts comprising a swivel block, means actuated by the driving shaft for gyrating said swivel block about two axes through the agency of coasting friction surfaces and means for communicating the gyration of the swivel block about one axis to the driven shaft for oscillating the latter, the axes of the driving shaft, the driven shaft and the swivel block intersecting at a common point.

7. An edge setting machine comprising, in combination, a rotating driving shaft, a driven shaft, a tool operated by said driven shaft, and transmission means intermediate said shafts comprising a swivel block, means actuated by the driving shaft for gyrating said swivel block about two axes through the agency of coasting friction surfaces, and means, including other coasting friction surfaces, for communicating the gyration of said swivel block about one axis to the driven shaft for oscillating the latter, the axes of said driving shaft, driven shaft and swivel block intersecting at a common point.

8. An edge setting machine comprising, in combination, a driving shaft, a driven shaft, a tool operated by said driven shaft, and transmission devices intermediate said shafts comprising an exaxial member arranged to be actuated by the driving shaft, a swivel block, said exaxial member and swivel block having coasting friction surfaces operatively associated therewith for communicating the action of the former to the latter, a hub connected with the driven shaft, said swivel block and hub being provided with friction surfaces which coast to transmit the action of the former through the latter to the driven shaft.

9. In an edge setting machine, a driving shaft, a driven shaft, an exaxial member arranged to be actuated by the driving shaft, a sleeve on said exaxial member, said exaxial member and sleeve having coasting friction surfaces, a swivel block connected to said sleeve and arranged to move in consonance therewith, a hub connected to the driven shaft, said swivel block and hub having coasting friction surfaces for communicating the effective action of the former to the latter and therethrough to the driven shaft.

10. In an edge setting machine, a rotating

driving shaft, a driven shaft, and means constructed and arranged to translate the rotary motion of the driving shaft into oscillatory motion of the driven shaft, said means serving also as a support for the driving shaft.

11. In an edge setting machine, a driven shaft, a driving shaft having an exaxial portion, a sleeve in which said exaxial portion is journaled for supporting the driving shaft, a swivel block connected to said sleeve, and means for communicating the motion of said swivel block to the driven shaft for oscillating the latter.

12. In an edge setting machine, a driven shaft, a driving shaft having an exaxial portion, a sleeve in which said exaxial portion is journaled for supporting the driving shaft, a swivel block rigidly connected to said sleeve, and a hub connected to the driven shaft and arranged to support said swivel block.

13. In an edge setting machine, a driving shaft, a belt pulley on said driving shaft, a plurality of driven shafts symmetrically disposed relatively to said belt pulley, and transmission means intermediate the driving shaft and driven shafts, which translate the rotary motion of the driving shaft into oscillatory motion of the driven shafts, and also support the driving shaft.

14. In an edge setting machine, a driving shaft, coaxial driven shafts, and transmission means operatively connecting said driving and driven shafts and arranged to support a portion of the driving shaft.

15. An edge setting machine comprising,

in combination, a rotatable driving shaft, a driven shaft, and transmission means intermediate said shafts comprising a swivel block and an exaxial member extending through said swivel block, said exaxial member being actuated by the driving shaft to cause the swivel block to gyrate about a plurality of axes and means for communicating the motion of said swivel block about one of said axes only to the driven shaft to oscillate the latter.

16. An edge setting machine comprising, in combination, a rotatable driving shaft, a driven shaft and transmission means including an exaxial member intermediate said shafts which coacts through sliding friction to transmit the rotary motion of the driving shaft into oscillatory motion of the driven shaft, said driving shaft and driven shaft having axes which intersect at a point within the exaxial member.

17. An edge setting machine comprising, in combination, a rotary driving shaft, an exaxial member driven thereby, a swivel block coöperating with said exaxial member, and a driven shaft, said driving shaft, exaxial member, swivel block and driven shaft having axes which intersect at a common point within the exaxial member.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ARTHUR ERNEST JERRAM.

Witnesses:

JOHN RICHARD LAW,  
GRACE HOLMES.