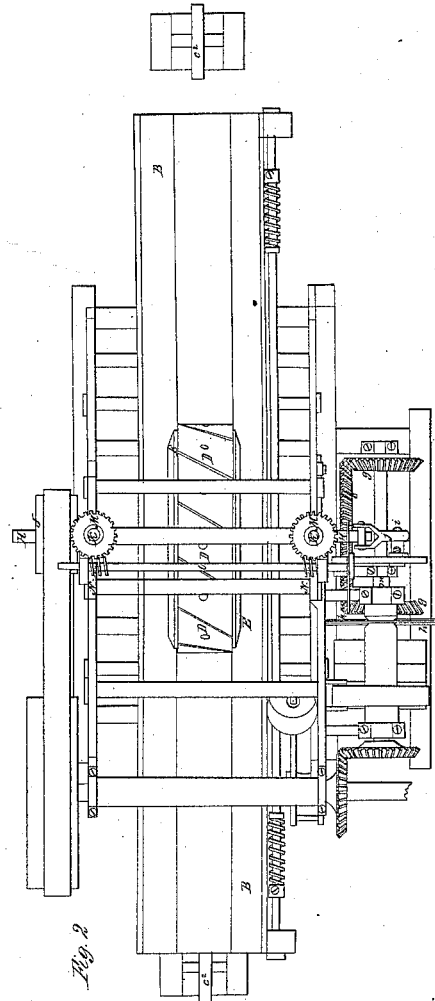
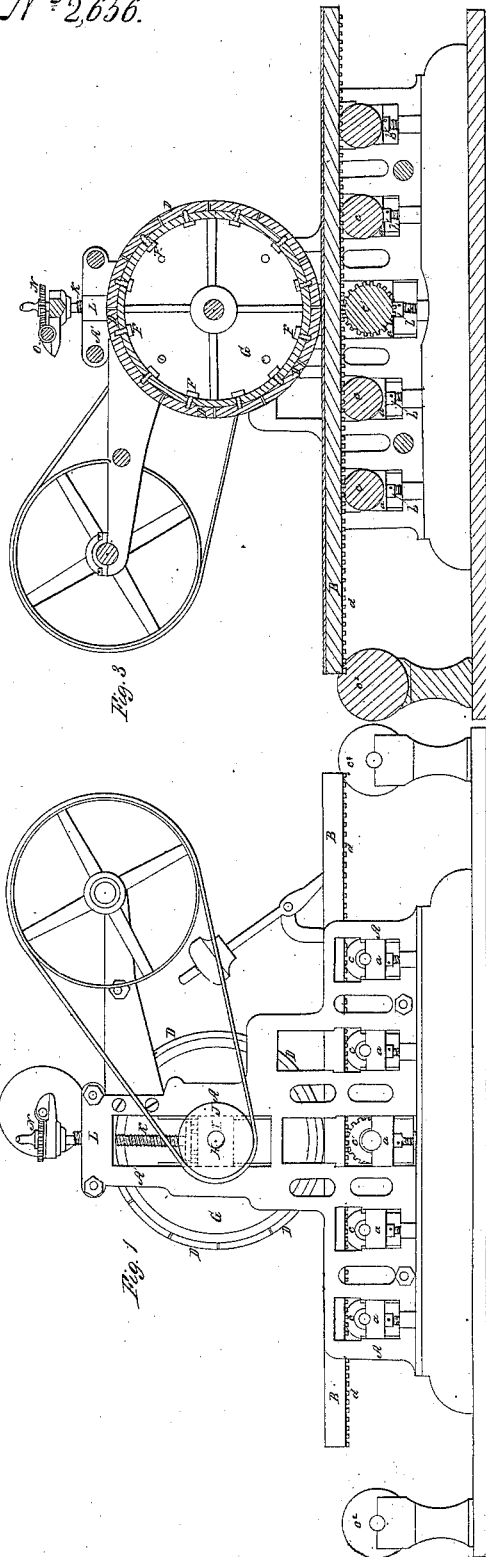


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Grinding Saw-Plates.

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Patented May 30, 1842.

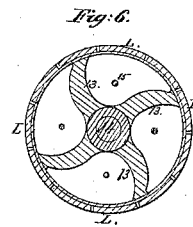
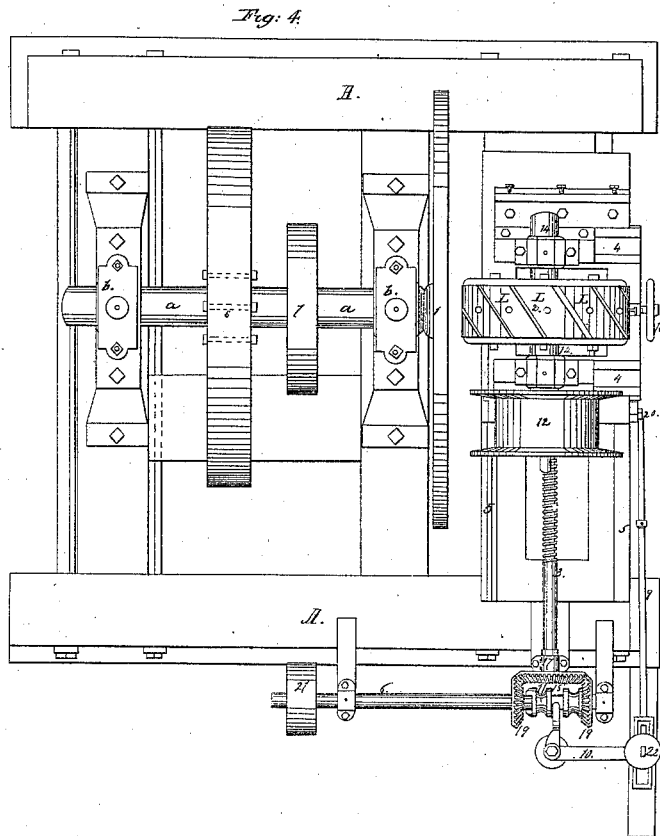
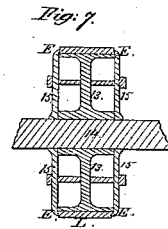
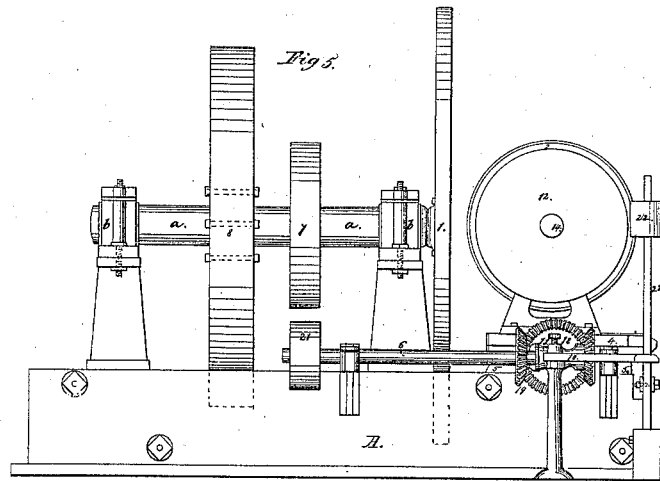


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UNITED STATES PATENT OFFICE.

RICHD. M. HOE, OF NEW YORK, N. Y.

MACHINERY FOR GRINDING AND POLISHING METALLIC SURFACES, PARTICULARLY SAW-PLATES.

Specification forming part of Letters Patent No. 2,656, dated May 30, 1842; Reissued May 5, 1857, No. 462.

To all whom it may concern:

Be it known that I, RICHARD M. HOE, civil engineer and machinist, of the city of New York, State of New York, have invented certain new and useful improvements in machinery for grinding and polishing metallic surfaces or plates and which is applicable in an especial manner to the grinding and polishing of saw-plates, so as to give them an even surface and an equal thickness, said machine being so modified as to adapt it to those plates which are circular as well as to those which are straight; and I do hereby declare that the following is a full and exact description thereof.

When my machine is intended for the grinding and polishing plates of metal for long saws, such as mill, cross-cut, or others; or for long surfaces, or plates, of metal for other purposes, I prepare a table, or bed, of metal, sufficiently long and wide to sustain the largest plates, or pieces, upon which it is intended that the machine shall operate. This bed, or table, is to be made perfectly true on its upper surface, by planing, grinding, or otherwise; and it is to be supported upon rollers which have gudgeons that run in suitable boxes on each side of the framework of the machine, and are made adjustable by means of set screws. The bed, or table, is to have a traversing motion from end to end, which may be given to it by any of those mechanical devices which are used for such a purpose. It may, for example, be obtained by means of a revolving screw operating in the manner of that frequently used for carrying the slide rest of a lathe back and forth. Or it may be effected by extending a rack, or racks, along the under side of the table, and placing upon the axis of one, or more, of the rollers upon which the table rests, or upon a separate axis, a toothed wheel, or wheels, gearing into such rack, or racks; such geared axis, roller, or rollers, having motion communicated to them by means of suitable gearing, or bands, connected with the general motive power employed; the parts being so arranged as that the motion of the table shall be reversed at the proper instant, and that it shall be kept traversing back and forth during the whole time that the machine is in operation. Above this table there is to be a grinding, or polishing drum, or cylindrical lap, to

which a continuous revolving motion is to be given, the outer diameter, or periphery, of such drum, or lap, being its grinding, or polishing, surface. The shaft of this cylindrical, grinding, or polishing lap turns in suitable bearings, which are to be furnished with strong screw, or other, adjustments, by means of which the position of the cylindrical lap, or its distance from the table, may be regulated at pleasure, to suit plates of different thickness, or to determine the force with which the lap shall bear upon the plate to be ground, or polished. The revolving lap is to have, also, a horizontal, traversing motion, from side to side of the machine, for the purpose of shifting, continually, the points of contact between the lap and the plate; thereby preventing the undue wearing of either in any particular part, and preserving a true cylindrical surface on the lap, and perfect flatness on the plate. This traversing motion may be given to the shaft of the lap by means of a revolving, or oscillating, crank and a connecting rod; or by means of a grooved snail, or cam wheel acting upon the end of the shaft, or in any other of the modes of effecting this object which are well known to machinists.

When the machine is to be used for the grinding and polishing of circular plates, a shaft, or mandrel, like the mandrel of a lathe, is to be made to revolve in suitable collars, or on centers; and this mandrel is to carry a circular disk, or flat plate, like the face plate, or chuck, of a lathe, such plate being furnished with suitable means for holding in place the saw or other plate to be ground or polished. The chuck, or face plate, may be made to revolve either vertically, or horizontally, but I prefer the former position, and have so represented it in the accompanying drawings. A grinding and polishing drum, or cylindrical lap, similar in all respects to that used for straight saws, is to be mounted on a suitable head, in front of the revolving plate; which head may rest on a double V, or other suitably shaped, bed, along which it may be guided, like the slide rest of a lathe. The head which carries the grinding, or polishing, lap is to have a traversing motion given to it by means of a screw, a rack and pinion, or other device, so that the lap may be made to pass back and forth across the face of the

plate, to and from its periphery and center. The revolving lap is made adjustable, so that its distance from, and the force with which it may be made to bear upon, the plate to be ground, may be regulated.

The most important improvement that I have made in this apparatus, is in the manner of constructing the cylindrical grinding and polishing drum, or lap. Those which have been hitherto made with grinding and polishing faces of metal, have been formed either of a solid mass, or the cylindrical face, or surface, has consisted of a continuous rim or hoop, of metal; and these laps frequently become untrue from expansion, are with difficulty renewed and kept in order, and are attended with other inconveniences. My improved lap has its face, or grinding and polishing surface, formed of a number of separate plates of metal, say of half an inch, more or less, in thickness, which plates are to be placed around the face of a metallic hub, which has a projecting rim on each side between which the edges of the plates are to be clipped; one or more screws, or bolts, also passing through each plate, whereby they are securely fastened to the hub; the plates so arranged and affixed will not be disturbed by expansion and contraction, or from any other cause, while they are readily renewed and easily kept in perfect order. The line of junction between these plates I prefer to make pass obliquely across the face of the lap.

In the accompanying drawings, Figure 1, is a side elevation of the machine, as constructed for the grinding and polishing of straight saws. Fig. 2, is a plan, or top view, of the same, and Fig. 3, a vertical section taken longitudinally through its center.

A, A', is a strong frame-work, and standards, of cast-iron, securely fixed on a foundation, or ground work, and properly connected together by cross bolts and braces.

B, is the traversing, horizontal table, or bed, resting upon, and supported by, several rollers C, C, C, the edges of which turn in bearings, or brasses, a, a, placed between grooves, or guides, in the framework; these bearings are supported upon adjusting screws b, b, on each side of the machine; the table may by means of these be placed a little out of the horizontal, transversely, or at an angle with the axis of the grinding lap, whenever it is desired to grind plates a little thicker on one edge than on the other, which should be done on all long saw blades. The middle roller C', may carry toothed wheels, or pinions, c, which may take into racks d, on the under side of the table, and give it the desired traversing motion. The roller C', may receive its alternate, rotary motion from the beveled wheel e, which is driven in reversed directions, alternately, by the wheels g, g, these being actuated by

clutches, or engaging and disengaging apparatus, in any of the ways known to machinists, and which it is not necessary to describe, as I do not intend to limit myself to any particular manner of effecting this object. In my first essays, I employed pressing rollers to bear upon the upper surfaces of saws to be ground and polished, but I have found in practice that check pins, or other devices of the most simple character, are sufficient for this purpose, the plates having but little tendency to rise up from the table. C² are pulleys, upon stands, to support the table.

G, is the main body of the cylindrical drum, or lap, by which the grinding and polishing are effected.

D, D, D, are metallic segments which surround the face of the hub; E, E, being ledges on each side of the hub, between which the segment pieces are embraced.

F, F, are screws by which the segment pieces are fastened to a hoop, or rim, making a part of the hub. These cylindrical laps are to be supplied with emery, or with any other grinding or polishing powder, or other substance, mixed with oil, water, or other fluid, according to the nature of the work to be performed. The metallic segments may be composed of various metals, or alloys, adapted to the material which is to be spread upon them, and to the effect they are intended to produce.

The cylindrical lap is mounted upon a shaft, or axis, H, passing through carrier bearings I, placed between guides in the grooves of the standards A'. Upon one end of the shaft H, is fixed a driving pulley, or rigger, J, which may receive its rotary motion from a drum, or pulley, on the shaft of the first mover; the motion of the lap should be very rapid, say about 300 revolutions in a minute, and its shaft may be supplied with different sized pulleys, or riggers, to give different velocities thereto. The manner of adjusting the lap, so as to bear with the proper degree of force upon the bed, may be varied; that represented in the drawing is convenient and effective. In this, the bearings I, are connected by collars and stirrup pieces to the screws K, K, which pass through the female screws at L, L, fixed in the crossheads of the standards A'. In order to turn the screws K, K, simultaneously, they are each furnished with a screw wheel M M, into which are geared the two endless screws N, N, placed on the shaft O, turning in bearings on brackets on the tops of the screws K; the shaft O, may be turned by means of a winch, or otherwise, and the lap will thereby be raised, or lowered. The traversing motion of the shaft H, carrying the cylindrical lap, may be effected by the following means. A shaft m, may be made to revolve by means of a band and pulley h, 130

or in any other convenient way; this shaft carries an adjustable crank pin *z*, connected to the shaft of the lap, by means of a connecting rod *j*, and the lap may thus be gradually, and progressively, moved across the bed by the machine, and the position of the actual grinding surface be thereby constantly shifted across the surface, or plate, which is being ground, or polished.

Figs. 4 and 5, show the apparatus as arranged for grinding and polishing the plates of circular saws, or other articles of a like character. Fig. 4, is a top view of the principal operating parts of the machine so modified, and Fig. 5, an end elevation. The frame A, A, which forms the basis of the instrument, is represented as made of wood, but the whole may be of cast-iron. No. 1, is the revolving, circular disk, or face plate, upon which the saw plate, or other article to be ground and polished is to be placed, it being held there by clips, or other suitable means. The face plate is affixed on one end of a mandrel *a, a*, which is driven by a band from the first mover, embracing the whirl No. 8. No. 2, is the cylindrical lap, the face, or periphery, of which is formed of a number of separate plates L, L, L, as above described. Fig. 6, is a sectional view through the middle of this lap transversely to its axis No. 14; and Fig. 7, is a section along said axis. The lap may be formed with arms 13, 13, proceeding from its center, or hub, to a circular rim, which sustains the plates L, L, that constitute the grinding surface. Nos. 15, 15, are the side plates of the hub of the lap, and these being drawn together by screws, will clip the plates L, L, by their projecting edges at E, E. The lap No. 2, may be made to revolve by a band embracing the whirl 12, on its axis. The head upon which the lap has its bearings has a sliding motion to and from the face plate, and also in the direction of its plane. Nos. 4, 4, are guide grooves in which it slides to and from the face plate, its motion being governed by a set screw 16, by which, also, it will be held in any required situation; Nos. 5, 5, are the V, or other, grooves, or ways, on which it is to slide in the direction of the plane of the face plate; this motion may be effected in the following manner. No. 3, is a leading screw which runs in suitable bearings 17, on the bed of the machine, and passes through a female screw, or nut, in the lower

part of the head of the lap. On the outer end of this screw is a bevel wheel 18, which gears into two bevel pinions 19, 19, that run loose on the shaft 6. No. 11, is a clutch box sliding on shaft 6, and clutching the pinions 19, 19, alternately, by the motion of the kneed lever 10, which is connected to the sliding rod 9; said rod having on its adjustable tappets, against which a projecting pin 20, attached to the sliding head, operates in a manner well understood by machinists. The shaft 6, has on it a whirl 21, and may be driven by a band from a whirl 7, on the mandrel. No. 22, is a weighted, tumbling lever, which is operated on by the sliding rod 9, and causes the clutch lever 10, to act with the force necessary to carry the bevel wheels into gear; but any of the known devices for producing a reciprocating motion, of the kind required, may be applied to this machine, as under the modification first described.

Having thus fully described the manner in which I combine and arrange the machinery, or apparatus, for grinding and polishing metallic surfaces; and having, also, pointed out various ways in which the same may be modified, under each of which a like end may be attained by combinations, and modes of action, substantially the same, what I claim therein as new, and desire to secure by Letters Patent, is—

The combining with the reciprocating beds, or tables, or with the revolving disk, or face plate, the cylindrical lap, herein described, which is made to traverse back and forth upon its axis, and which may be borne up with any required degree of force against the article to be ground, or polished, in the manner set forth; the face, or periphery, of said cylindrical lap being composed of a number of separate and distinct plates of metal which are to constitute the grinding and polishing surfaces, and which are to be held in place by a screw, or screws, and by being confined between rims, or in other suitable modes, substantially the same; the distinguishing feature of the said lap being the dividing of its periphery into separate plates, and combining the same together as herein set forth.

RICHD. M. HOE.

Witnesses:

A. J. BOWEN,

THOS. S. HOLLINGSWORTH.