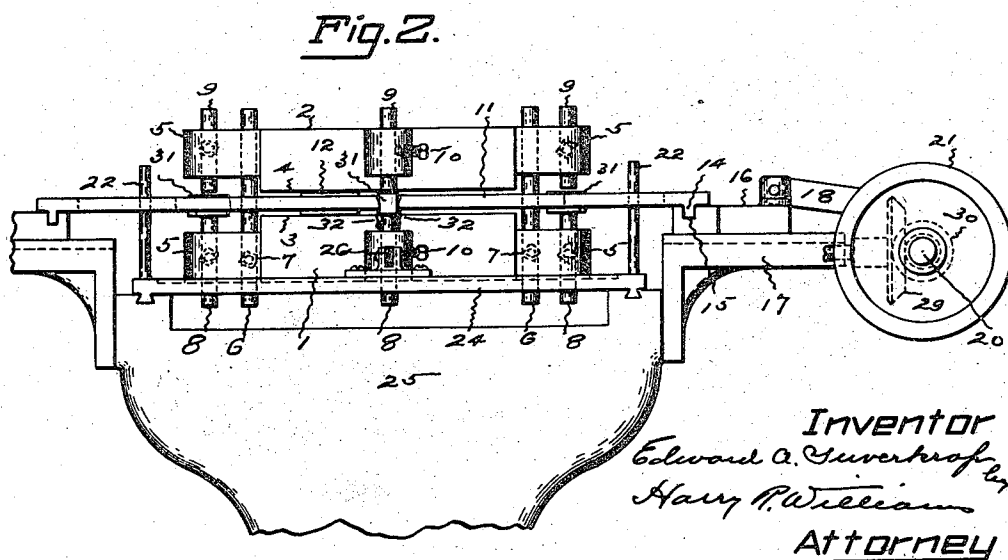
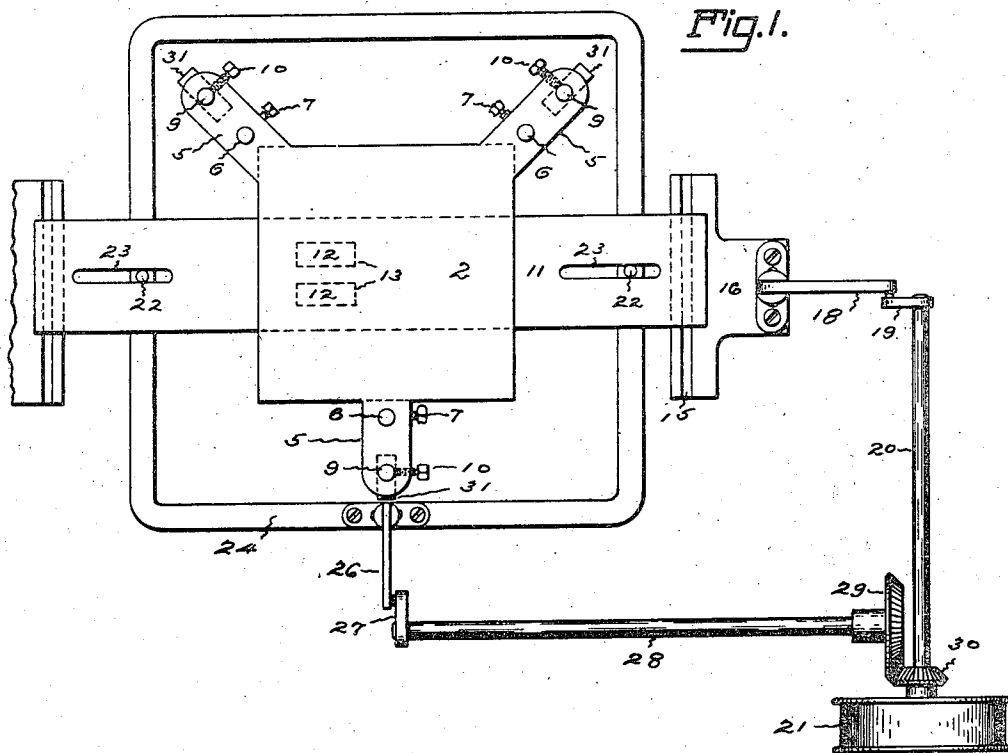


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 APPARATUS FOR LAPPING METAL.
 APPLICATION FILED MAR. 23, 1917. RENEWED JAN. 2, 1918.

1,257,047.

Patented Feb. 19, 1918.



UNITED STATES PATENT OFFICE.

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APPARATUS FOR LAPPING METAL.

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Specification of Letters Patent.

Patented Feb. 19, 1918.

Application filed March 23, 1917, Serial No. 156,854. Renewed January 2, 1918. Serial No. 210,073.

To all whom it may concern:

Be it known that I, EDWARD A. SUVERKROP, a citizen of the United States, residing at Sea Cliff, Long Island, in the State of New York, have invented a new and useful Improvement in Apparatus for Lapping Metal, of which the following is a specification.

This invention relates to an apparatus for lapping pieces of metal, and more particularly blocks which are designed to be used as standard gages, which blocks must have their opposite surfaces, as near absolutely parallel, flat and smooth as possible and exact distance apart.

In lapping metal blocks heretofore it has been customary to charge a plate of metal that is softer than the metal to be lapped with hard granular material by rubbing or rolling the material dry or wet with light oil into the plate to be charged, and then by hand without too much pressure rubbing the blocks to be lapped over this charged surface until the blocks have been reduced to the desired state. In lapping blocks in this manner it is necessary to frequently stop and allow the blocks to cool so that they will not curl and their surface be lapped in such manner that when finished and cooled they will be curved. Great care also has to be exercised to prevent the edges of the blocks from being rounded so that the blocks will be thinner about the edges than at the center.

The object of the present invention is to provide a very simple apparatus which may be manipulated by unskilled labor so as to produce one, or several gage blocks simultaneously in much shorter time than is possible by hand, and to insure absolute flatness, smoothness and parallelism of their opposite surfaces and their exact thickness at all points.

The apparatus illustrated for accomplishing this end has two lap plates with their opposing faces charged with or formed of granular abrasive material, one plate being movable toward the other, with means for insuring at all times the parallelism of the charged lapping surfaces of these plates and means for stopping the approach of one toward the other at an exact predetermined distance. The work plate, provided with recesses for receiving the blocks to be lapped, is arranged to be reciprocated between the lap plates in two directions, the movements

in one direction being faster than the movements in the other direction, and thus carry the blocks across the entire lapping surfaces so the blocks will be uniformly lapped on both sides at the same time, and danger of their curling as a result of heating and their peening out around the edges so that the edges will be thinner than the middle be eliminated.

Figure 1 of the accompanying drawings shows a plan of a very simple form of lapping apparatus which embodies this invention, the supporting parts being omitted as they may be of any common form and construction and are not material to the invention. Fig. 2 shows a side view of the same.

The lower lap plate 1 and the upper lap plate 2 are illustrated as of the same size and shape, the former having a surface which is charged with or formed of hard granular abrasive material and the latter having a surface 4 which is similarly charged with or made of hard granular abrasive material. Each of the lap plates shown has three outwardly extending arms 5. Extending through an opening in each arm of the lower lap plate and through an opening in each corresponding arm of the upper lap plate is a guide post 6. These guide posts are arranged parallel with each other and perpendicular to the lapping surfaces of the plates, and they are desirably fastened in the opening in the lower arms by set screws 7 and have a sliding fit in the openings of the upper arms. As a result of this construction the upper lap plate will move on these guide posts toward and from the lower lap plate in such manner that the lapping surfaces of the two plates will always be exactly parallel.

Extending through each of the arms of the lower lap plate is a gage post 8 and extending through each of the arms of the upper lap plate is a gage post 9. These gage posts have a moving fit in the openings through the arms and are designed to be fastened therein by set screws 10.

The work plate 11 or the plate which is designed to carry the blocks 12 to be lapped is movable between the lapping surfaces of the lap plates. This work plate may have one or as many openings 13 as desired of a shape to loosely retain the blocks to be lapped. The work plate is preferably reciprocated longitudinally at a rather fast rate of speed, and at the same time that it is being

rapidly reciprocated longitudinally it is arranged to be carried transversely so that the blocks to be lapped will not travel back and forth in the same paths, but while traveling
 5 back and forth will be carried sidewise across the lapping surfaces.

For effecting the longitudinal movements the work plate may be connected by a tongue 14 and groove 15 with a slide 16 that is movable back and forth in a way in a bracket 17 by means of a link 18 connected with a crank 19 on the end of a shaft 20 which is provided with a driving pulley 21. For carrying the work plate transversely it may
 10 by pins 22 and slots 23 be connected with a frame 24 that is movable back and forth in the top of a bed 25 by means of a link 26 connected with a crank 27 on a shaft 28 which may have a gear 29 meshing with a pinion 30 on the pulley shaft. Thus these mechanisms will move the work plate transversely at a slow rate of speed while it is being reciprocated longitudinally somewhat faster.

In order to set the apparatus, before the work plate is arranged in operative position the upper lap plate is placed on the guide posts with the gage posts loose so that the two lapping surfaces will be together, the upper resting flatly upon the lower. With the lap plates in this relation the gage posts are brought together until they just abut and they are fastened in this relation. The upper lap plate is then lifted off and the
 35 work plate with the blocks to be lapped placed in position, after which the upper lap plate is again set on the guide posts. Gage blocks 31 having a thickness equal to that to which the pieces are to be lapped may then be placed between the guide posts and held in position by suitable means, such as spring fingers 32. When the machine is set in operation the blocks carried by the work plate will be moved back and forth
 45 and sidewise between the lap plates and abraded until the lower ends of the upper gage posts impinge upon the upper surfaces of the gage blocks on the lower gage posts. Then, of course, as the two plates can come no closer together the abrasion of the blocks carried by the work plate ceases. The blocks to be lapped are ordinarily cut from rods of hard steel to approximately .01 of an inch of finished size and after they are
 55 ground on a grinder or by other suitable means to approximately .001 of an inch, they are placed in this apparatus and subjected to the action thereof and lapped to within approximately .00001 of absolute
 60 exact size.

The invention claimed is;

1. An apparatus for lapping metal having

two lap plates with lapping surfaces movable toward each other, means for insuring the parallelism of the lapping surfaces in all positions, means for stopping the movement of the lapping surfaces toward each other, a work carrying plate between the lap plates, and means for reciprocating the work carrying plate longitudinally and transversely.

2. An apparatus for lapping metal having two lap plates with lapping surfaces movable toward each other, means for insuring the parallelism of the lapping surfaces in all positions, means for stopping the movement of the lapping surfaces toward each other, a work carrying plate between the lap plates, and means for reciprocating the work plate longitudinally and transversely at different rates of speed.

3. An apparatus for lapping metal having a stationary lap plate, a lap plate movable toward and from the stationary lap plate, means for insuring the parallelism of the lapping surfaces of the lap plates at all times, means for stopping the movement of the upper lap plate toward the lower lap plate at the desired distance therefrom, a work carrying plate between the lap plates, and means for reciprocating the work carrying plate longitudinally and moving it transversely at the same time.

4. An apparatus for lapping metal having two lap plates with lapping surfaces movable toward each other, guide posts extending from one plate through the other plate, means for stopping the movement of the lapping surfaces toward each other, a work carrying plate between the lap plates, and means for reciprocating the work carrying plate longitudinally and transversely.

5. An apparatus for lapping metal having two lap plates with lapping surfaces movable toward each other, means for insuring the parallelism of the lapping surfaces in all positions, gage posts extending through the plates toward each other, means for fixing the gage posts a desired distance apart, a work carrying plate between the lap plates, and means for reciprocating the work plate longitudinally and transversely.

6. An apparatus for lapping metal having two lap plates with opposing lapping surfaces movable toward each other, means for insuring the parallelism of the lapping surfaces in all positions, means for stopping the movement of the lapping surfaces toward each other, a work carrying plate between the lap plates, and means for imparting relative forward and back and sidewise movements between the work carrying plate and lapping plates.

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