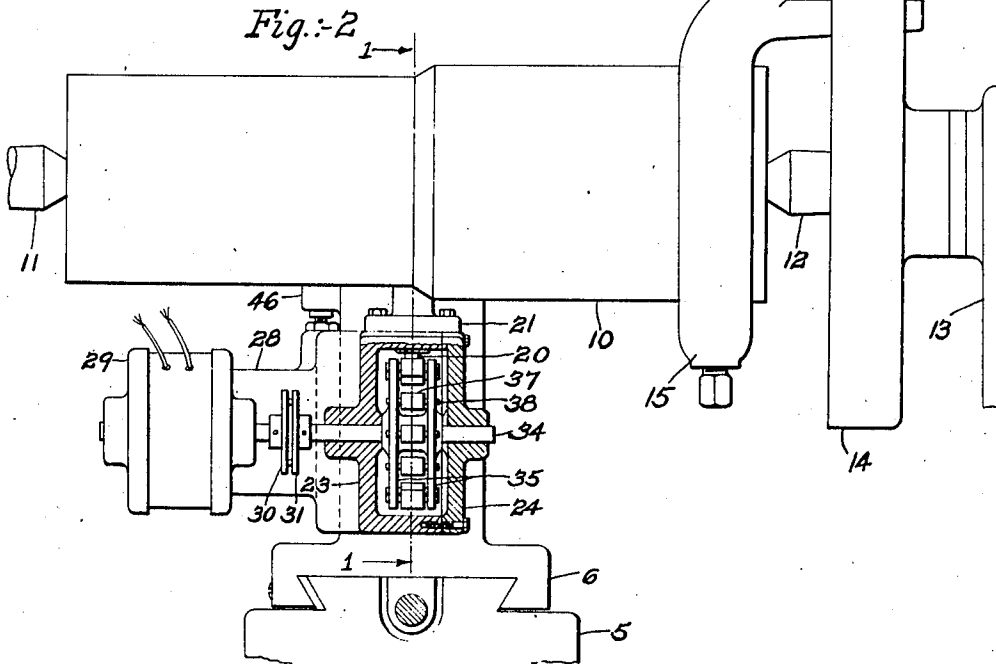
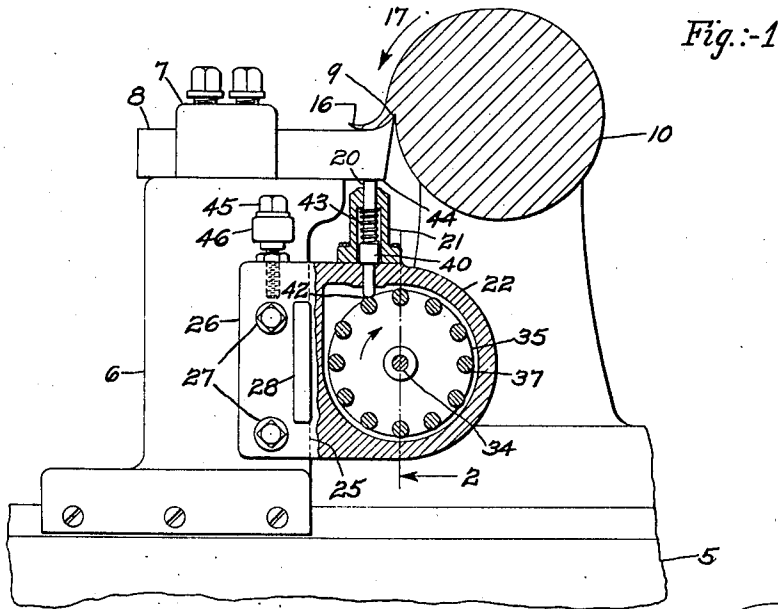


W. A. LORENZ.
METHOD OF CUTTING METALS.
APPLICATION FILED JUNE 11, 1917.

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METHOD OF CUTTING METALS.

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Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM A. LORENZ, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented new and useful Improvements in Methods of Cutting Metals, of which the following is a specification.

This invention comprises a process of cutting metals, to be applied to lathes, planers and other metal working machines in order to enable them to obtain greater production.

In the present practice lathe and planer tools are fixed in holders and provided with proper cutting edges, the work being moved against the tool in order to remove a definite amount of stock. Such removal of stock or "cut" requires an excessive amount of power in proportion to the useful work done.

My improved process consists in imparting to the cutting tool, which is supported in the machine, a rapid succession of preferably minute impacts or percussive vibrations in order to drive the tool by very rapid and short successive advances into the approaching metal, while it is being cut.

I attain this object by adding to metal working machine tools, impact producing means which are supported in the machine. I use for illustration an application of my novel process to an engine lathe, and show such application in the accompanying drawings, in which—

Figure 1 is a side elevation, partly in section, on the line 1—1 of Fig. 2, of part of a lathe carriage, a tool post slide and a tool post, and the impact producing means.

Fig. 2 is a rear elevation of Fig. 1, looking in the direction of the arrow, also shown partly in section on the line 2—2 of Fig. 1.

In the drawings, 5 represents a portion of a lathe carriage, which is supported in the usual manner upon a lathe bed, not shown. 6 shows the tool post slide, and 7 the tool post, supporting the tool 8, having a cutting edge 9. 10 represents a section of a shaft which is being turned, and which is supported in the usual manner upon centers 11 and 12, the center 12 being supported in the lathe head 13. 14 represents the face plate, and 15 the dog for driving the shaft, these latter parts not being shown in Fig. 1. 16 represents the chip being removed from

the shaft 10, the shaft turning in the direction of the arrow 17.

In order to apply impact vibrations to the cutting point 9 of the tool, I attach to the tool post, or to the carriage of the lathe, means for imparting rapid vibrations to the tool itself. These vibrations may be imparted at the bottom of the tool, as shown in the drawings, or they may be applied at an angle, if desired. The means for imparting the desired vibrations may be secured in many different ways. One of these ways consists in giving a series of impact blows to a plunger which will strike the lower side of the tool below the cutting edge of the tool. Such a plunger is shown at 20, being supported in a bracket 21 attached to the impact wheel case 22. This impact case consists of a shell having the outer portion 22, and two side portions 23 and 24, the case itself resting against the tool post 6 at 25 and being provided with a flange 26. By means of bolts 27 this flange is secured to the side of the tool carriage. A projecting flange 28 carries a motor 29 shown only in Fig. 2. The shaft of this motor carries a coupling 30, engaging another coupling 31, secured to the shaft 34, running in suitable bearings at the sides of the case 23 and 24. To this shaft 34 is attached a pair of rotating disks 35. These disks are provided with a series of rollers 37, each having two hubs 38, engaging holes in the two disks 35, the holes being a little larger than the hubs of the rollers.

When the disks 35 are rotated, centrifugal force will cause these rollers to fly outwardly, and bear with their hubs against the holes in the two disks. The plunger 20 is provided with an enlarged hub 40, and a reduced end 41, the lower end of which is arranged to engage the outer circumference of the projecting roller 37, which is shown in Fig. 1 at 42.

A spring 43 engages the collar 40, of the plunger, and presses with plunger downwardly. The upper end of the plunger 20 is brought in contact with the lower portion 44 of the tool.

An adjusting screw 45 engages the flange portion 26 of the case, and by means of this adjusting screw, which is held in a projection 46, of the tool slide, and by releasing the bolts 27, the entire case with the revol-

ing disks 35 and the plunger 20 may be adjusted to and from the lower portion 44 of the tool 8.

The operation of the apparatus is as follows:—

The plunger 20 is brought in contact or quite close to the surface 44 of the tool; the shaft is rotated in the direction of the arrow 17; the motor then drives the two disks at a high speed, which causes the rollers 37 to fly outwardly giving rapid impact blows against the lower part 41 of the plunger. In the drawings, twelve of these rollers are shown, and therefore each revolution will give twelve impact blows to the plunger. By running the motor at 1000 R. P. M., 12,000 blows will be delivered per minute against the tool, and these blows will be transmitted to the cutting edge 9 of the tool. These vibrations may be increased very considerably in number per minute, or decreased, according to the speed of the cut, and nature of the material.

The degree of impact against the plunger, by means of the rollers 37, may be varied in several ways; one of which consists of varying the speed of the motor. The higher the speed the greater the blow.

By this improved process of imparting minute impacts or percussive vibrations to the cutting edge of the tool while the work is moving against the tool, and while supporting both the tool and the impact means in the machine, less resistance will be met in

cutting the metal, and consequently less power will be required; or greater speed may be attained for equal power; or a greater cut may be made in a given time.

I claim as my invention:—

1. The process of cutting metals which consists in applying rapid and minute percussive vibrations to the cutting tool during the operation of cutting.

2. The process of cutting metals which consists of supporting the tool and the material to be cut, and in moving said tool and material against each other to maintain a cutting pressure, and of applying rapid and minute percussive vibrations to the cutting tool during the operation of cutting.

3. The process of cutting metals which consists in supporting the cutting tool, giving rapid and minute percussive vibrations to said tool and moving the metal to be cut against the said supported cutting tool.

4. In a metal cutting machine, means for supporting the work and the cutting tool, means for moving the work against the tool, means for applying rapid and minute percussive vibrations to said supported tool, during the cutting operation.

5. The process of cutting materials, which consists in supporting the work and the tool in a machine, moving the work against the tool, and giving to the tool a series of rapid and minute impacts or vibrations, during the process of cutting.

WILLIAM A. LORENZ.