R. PHILIPP.

PROCESS OF CRUSHING OR DIVIDING METAL SHAVINGS OR THE LIKE.

APPLICATION FILED FEB. 16, 1914.

1,133,181. Patented Mar. 23, 1915.

Fig. 1.

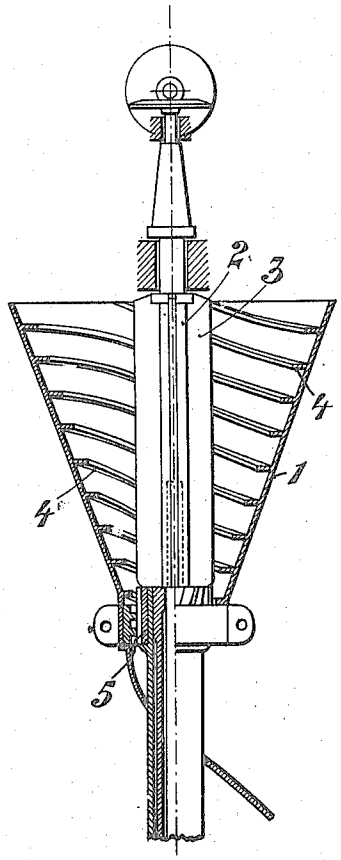


Fig. 2.

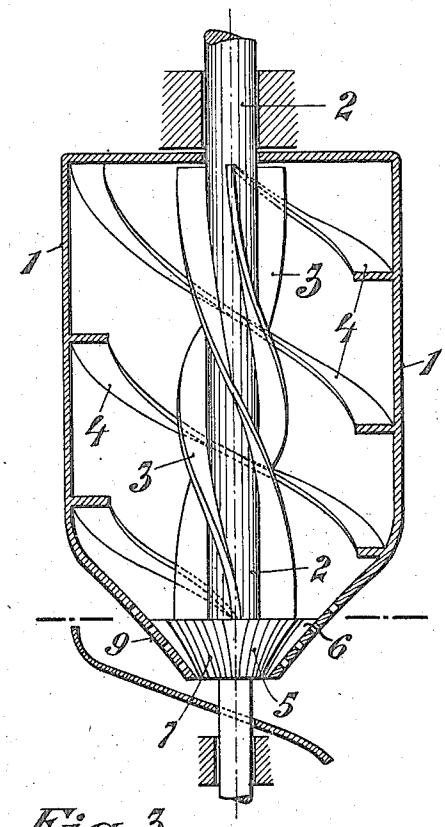


Fig. 3.

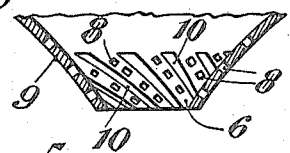


Fig. 4.

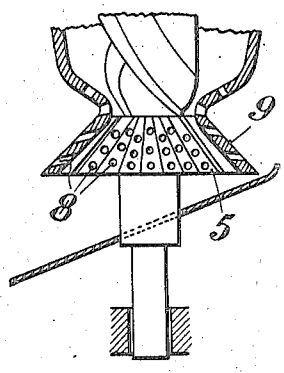
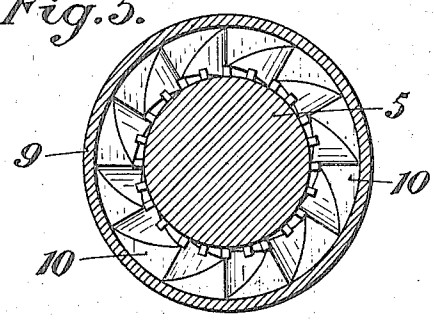


Fig. 5.



Witnesses:
M. E. McVade.

Inventor
Richard Philipp
by Otto L. Norris
Attorneys.

UNITED STATES PATENT OFFICE.

RICHARD PHILIPP, OF ILMENAU, GERMANY.

PROCESS OF CRUSHING OR DIVIDING METAL SHAVINGS OR THE LIKE.

1,133,181. Specification of Letters Patent. Patented Mar. 23, 1915.

Application filed February 16, 1914. Serial No. 819,050.

To all whom it may concern:

Be it known that I, RICHARD PHILIPP, a subject of the German Emperor, residing at Ilmenau, Thuringia, Germany, have invented certain new and useful Improvements in Processes of Crushing or Dividing Metal Shavings or the like, of which the following is a specification.

The process of crushing metal shavings and waste forming the subject of my invention, is divided into two main stages. First, the metal shavings are supplied to the crushing and reducing device, and second the crushing process proper is effected by said device.

According to my invention, metal shavings are introduced into a charging hopper, where they are seized by a spindle therein, and owing to the rotation of the spindle are caused to travel around the spindle, in the course of such travel being partly crushed and thereafter pushed through suitably shaped conduits in the hopper wall into the tapering lower portion of the hopper wherein the crushing device is located, which portion they leave in completely crushed condition. The process of crushing or reduction itself consists in the metal shavings which are forced into the tapering portion of the charging hopper, engaging with grooves provided in the shell or casing of a stationary hollow milling head, which grooves decrease in depth toward the outlet and in which the shavings are forced forward by the hollow milling head, and are seized and crushed by the cutting edges of the said head as they emerge from the grooves.

Several constructions according to the invention are illustrated by way of example in the accompanying drawing.

Figure 1 shows partly in longitudinal section a crushing device for carrying out the process of the present invention. Fig. 2 shows, also partly in longitudinal section, a slightly modified construction, while Figs. 3–5 show details of the milling head and its casing.

The shavings and the waste produced by modern metal working machines, such as lathes, boring machines, punching machines and the like, which felt together in large masses difficult to handle, are introduced into the casing of the crushing device. In the construction shown in Fig. 1, the casing is formed by the hopper 1. In the latter a spindle 2 rotates, said spindle being provided with longitudinal ribs 3 which engage the shavings so that they wind or twist about the said spindle and come into contact with the ribs 4 of the casing 1. Owing to the helical disposition of the ribs 4, the shavings are pushed toward the tapering lower portion of the hopper 1 whence they pass into the crushing portion of the device. While being pushed toward the narrow end of the casing, the shavings are compressed and partly crushed and broken by the ribs of the spindle and of the casing, so that they are already crushed, to a certain extent, during their advance. The crushing process itself will be explained with reference to the device shown in Fig. 2. In the latter, the casing 1 which is cylindrical in its upper portion, is conical at the lower end, and is provided in its interior with helical ribs 4. The spindle 2 rotating in the interior of the casing, is also provided with helical radial ribs 3 which extend to the milling head 5 located at the lower end of the spindle within the shell or casing 9. The ribs 4 of the casing 1 taper downward, and form conduits 6 which taper in cross-section and decrease in depth. The shavings enter the said conduits, and are forced forward, through the conduits, until they reach the milling head 5, and are seized by the cutting edges 7 of the latter and crushed. In the conduits 6 holes 8 may be provided to afford outlet to sufficiently crushed shavings, and at the same time take an active part in the reduction. If desired, the milling head 5 may also be provided with holes 8 (Fig. 4). The ribs 10 in the casing 9 of the milling head, between which the conduits 6 are situated, have their upper ends arranged in a common plane so as to form an annular grate (Fig. 5) which prevents large pieces of metal from reaching the milling head. These metal pieces remain here, until they are subsequently removed, or until they are milled to such an extent that they can safely pass the milling head.

While in the construction shown in Fig. 1, the milling or reducing head has practically a cylindrical shape, the milling head shown in Fig. 2, has the shape approximately of an inverted truncated cone, and the milling head in Fig. 4 forms an upright truncated cone.

The rotating part can be driven in any desired manner.

What I claim is:

1. The herein-described process of crush-

ing metal shavings which consists in feeding the shavings in a spiral path, and simultaneously subjecting them to a preliminary rubbing, cutting and crushing action to reduce and partially crush same; and finally subjecting the reduced and partially-crushed shavings at the completion of their feeding movement and of their said preliminary reduction to a milling action, to complete the crushing.

2. The herein-described process of crushing metal shavings which consists in feeding the shavings in a spiral path and simultaneously subjecting them to a preliminary rubbing, cutting and crushing action of gradually increasing intensity to reduce and partially crush the same; and finally subjecting the reduced and partially crushed shavings at the completion of their feeding movement and of their said preliminary reduction to a milling action to complete the crushing.

3. The herein-described process of crushing metal shavings which consists in causing the shavings to continuously move along a definite path, in simultaneously subjecting the shavings during the greater part of their movement to a preliminary rubbing, cutting and crushing action to reduce and partially crush the same, and in finally subjecting the reduced and partially crushed shavings during the remainder of their movement to a milling action, to complete the crushing.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

RICHARD PHILIPP.

Witnesses:
MARCX PHILIPP,
ERNST EBERHARDT.