

No. 684,043.

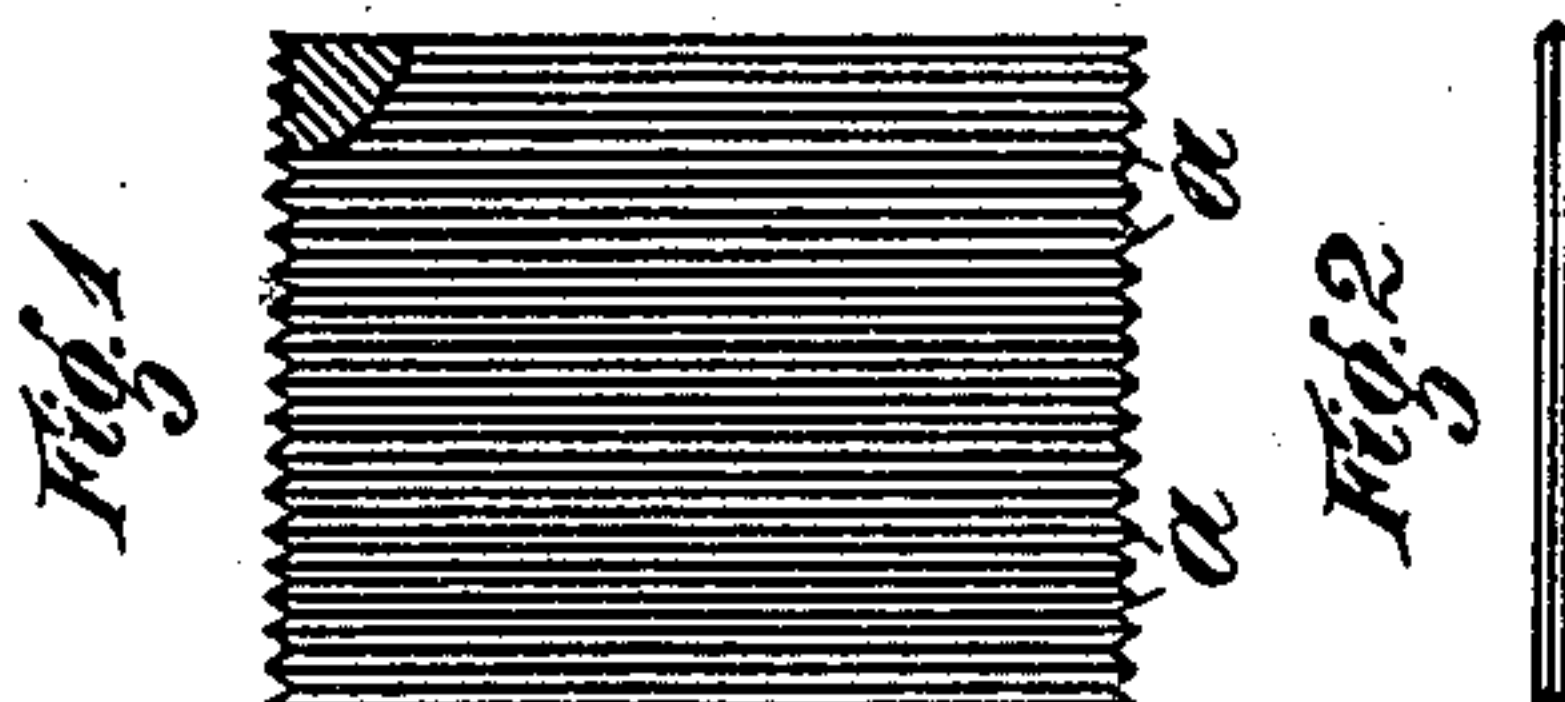
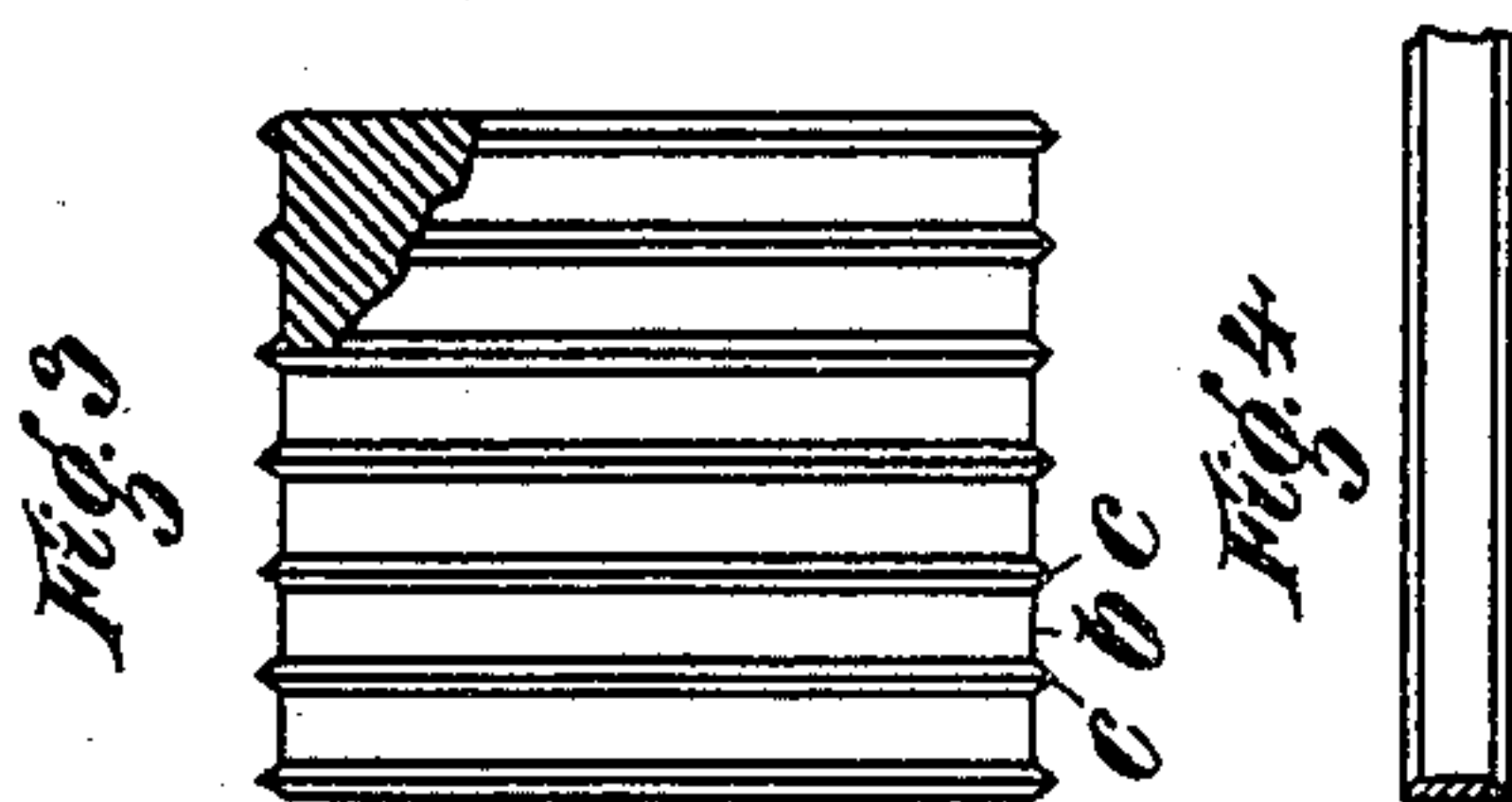
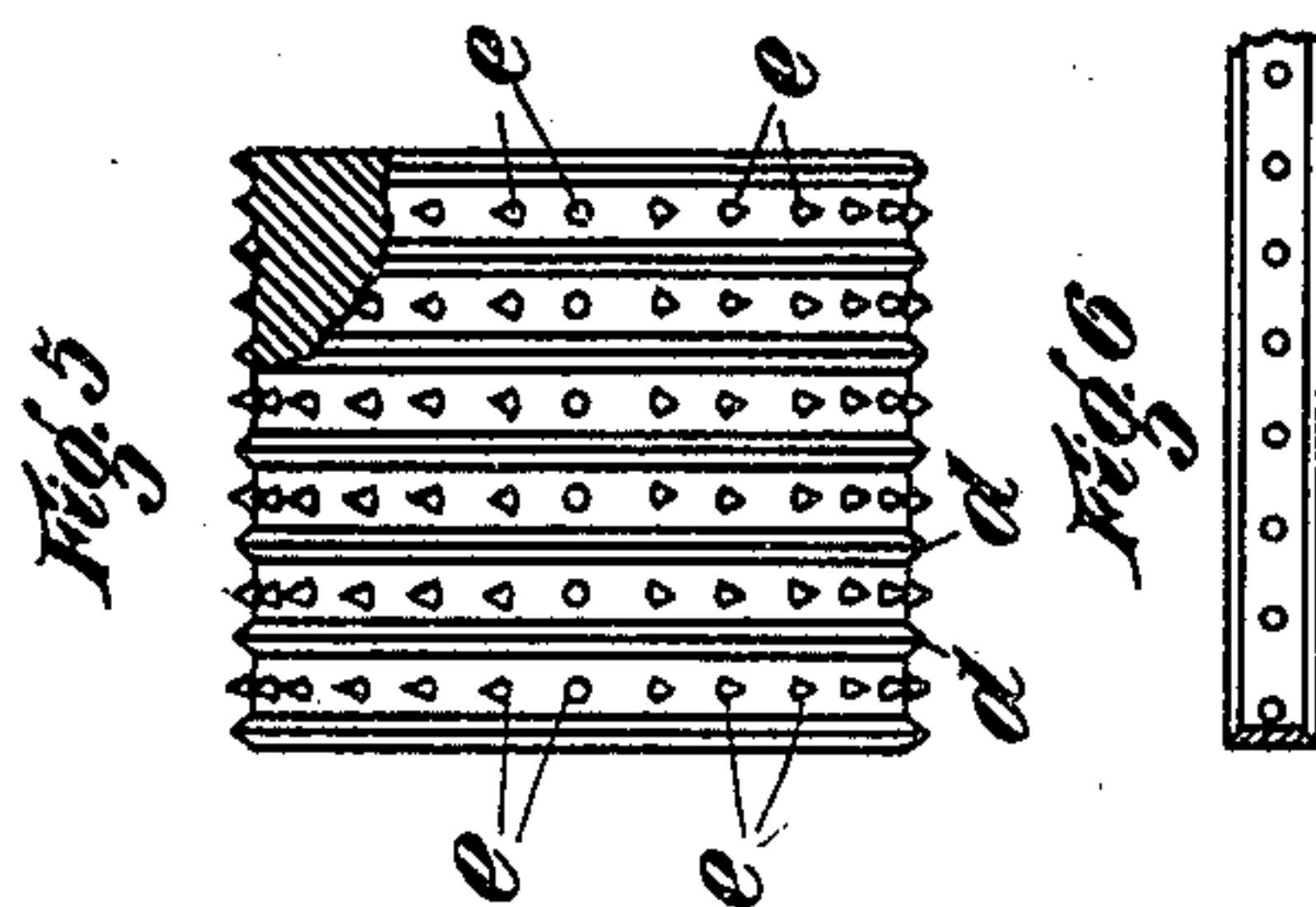
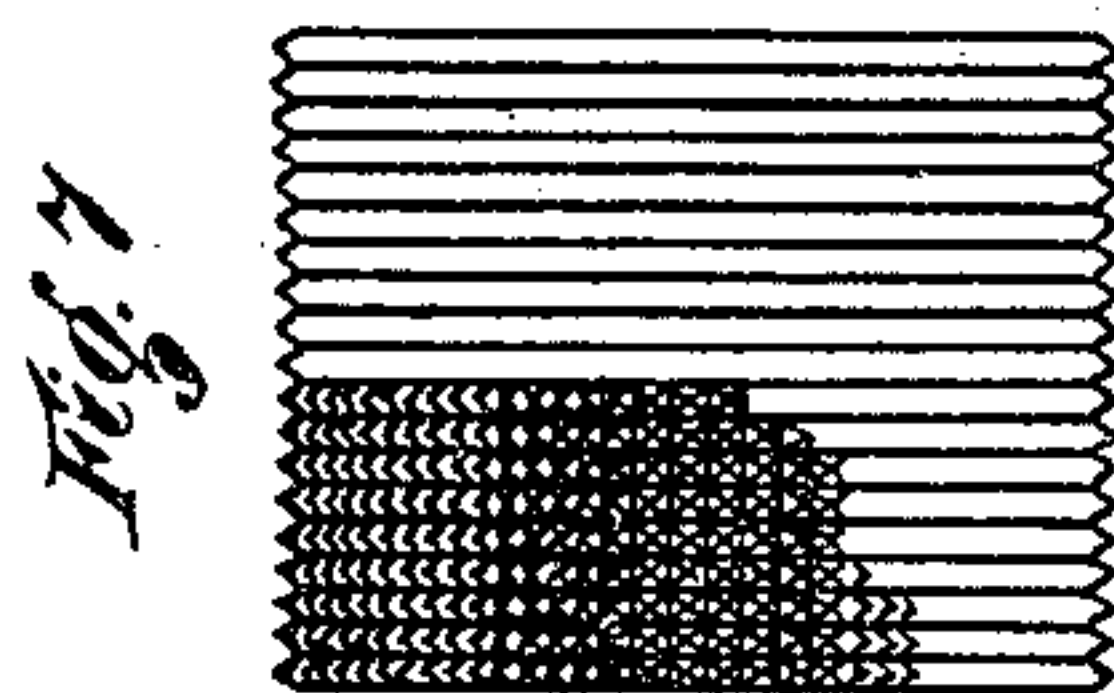
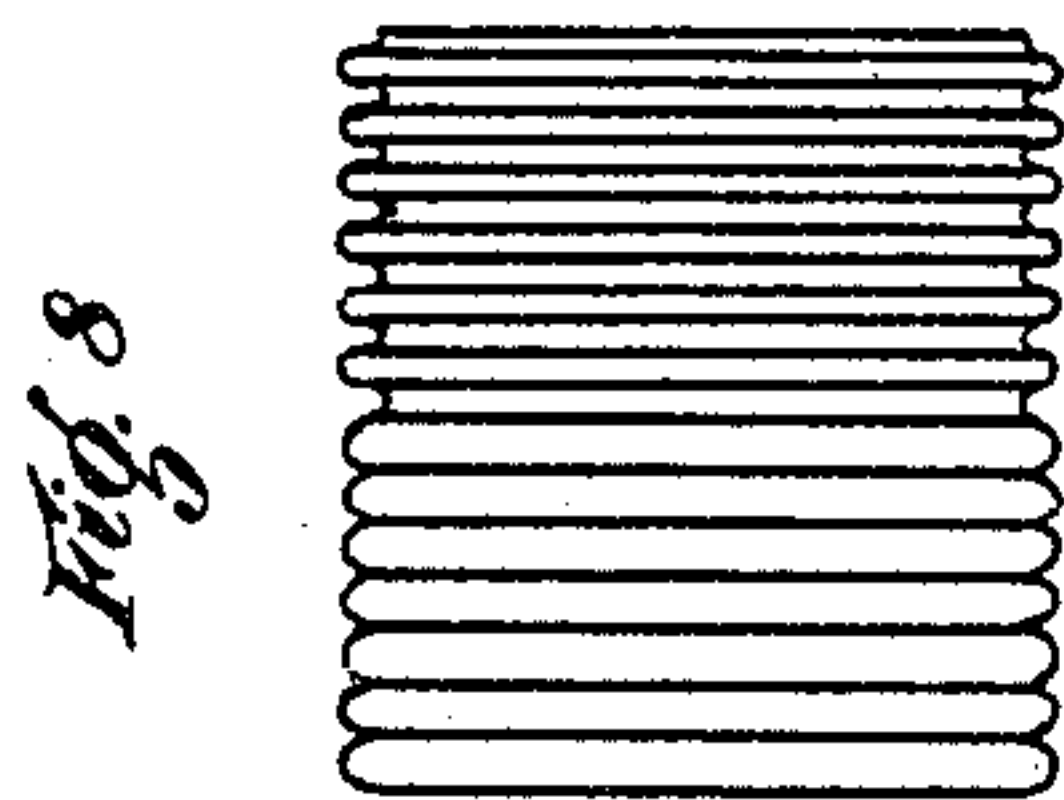
Patented Oct. 8, 1901.

F. W. BÜHNE.
APPARATUS FOR COMMUNUTING METALS.

(Application filed Dec. 19, 1900.)

(No Model.)

2 Sheets—Sheet 1.



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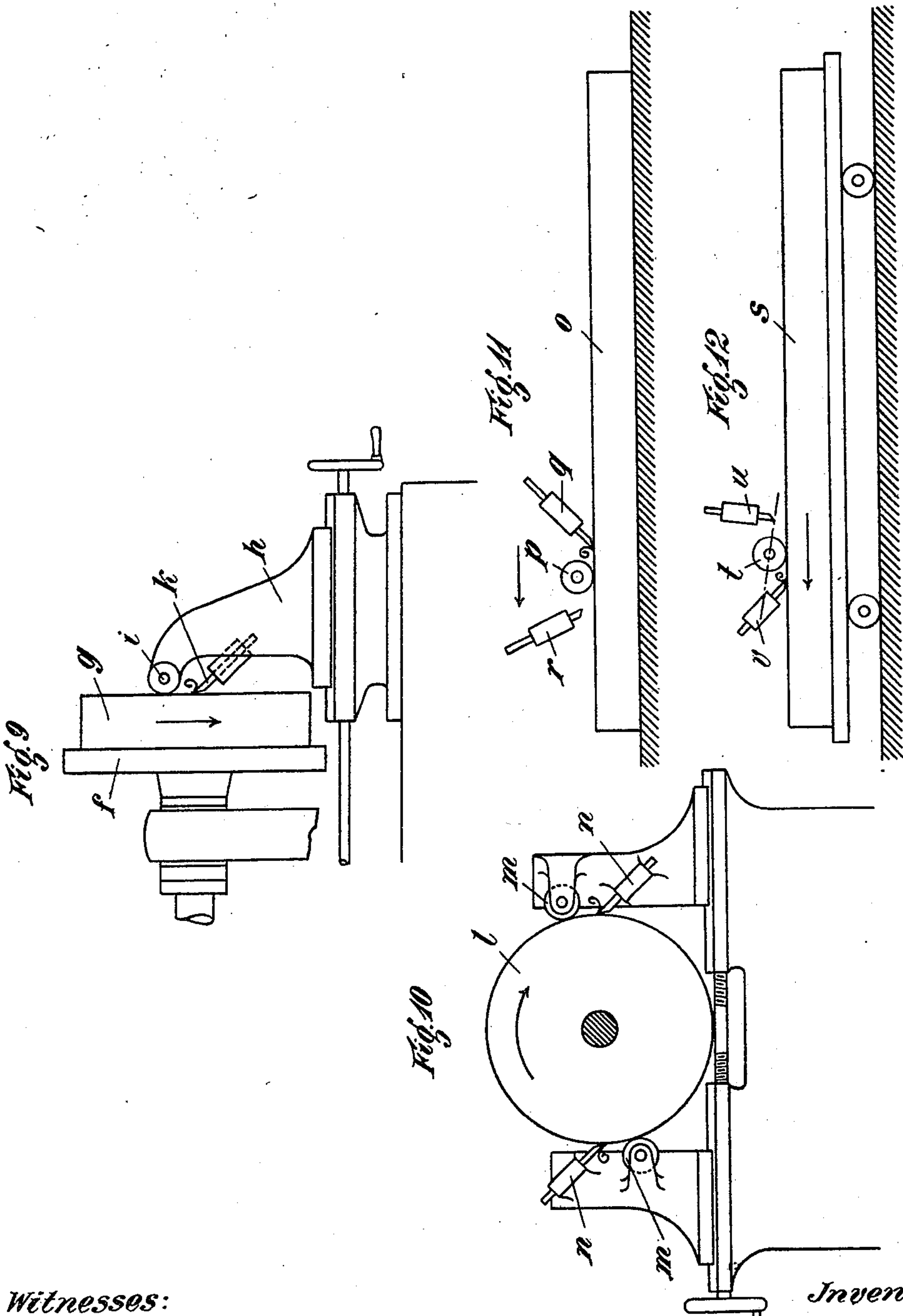
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2 Sheets—Sheet 2.

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UNITED STATES PATENT OFFICE.

FRIEDRICH WILHELM BÜHNE, OF FREIBURG, GERMANY.

APPARATUS FOR COMMINUTING METALS.

SPECIFICATION forming part of Letters Patent No. 684,043, dated October 8, 1901.

Application filed December 19, 1900. Serial No. 40,448. (No model.)

To all whom it may concern:

Be it known that I, FRIEDRICH WILHELM BÜHNE, manufacturer, a subject of the Grand Duke of Baden, residing at Freiburg, in the Breisgau district, in the Grand Duchy of Baden, German Empire, have invented certain new and useful Improvements in Apparatus for Comminuting Metals, of which the following is a specification.

10 The comminuting of metals has hitherto been effected by breaking by impact or percussion, rubbing or grinding, crushing, and the like.

15 The process of comminution as carried out by the apparatus forming the subject-matter of this invention serves to produce by a particular method products that possess considerable advantages from the fact that any desired form can be given to them. By means of this apparatus metals of all kinds can be cut up into fine powder, while also pieces of determined cross-section and determined length, as well as endless filaments, can be cut from metal.

25 According to the new apparatus a roller harder than the metal to be comminuted and having in its surface incisions or engravings of the desired form is pressed firmly on and moved over the metal to be comminuted. 30 The raised parts of the rolls cut or impress furrows and hollows, so that by means of a cutter subsequently applied metal powder or dust of any grain or pieces of any desired cross-section and length, also filaments or shavings of any cross-section and length, can be cut off, according to the nature of the surface of the impressing-roller. The metal to be comminuted may have a rotary or a rectilinear motion or it may be stationary, in 40 which case the impressing-roll and the cutter have the rotary or rectilinear motion.

In order to make my invention more clear, I refer to the accompanying drawings, in which similar letters denote similar parts 45 throughout the several views, and in which—

Figure 1 is a view of a roller with sharp-edged ribs located side by side without any intermediate space. Fig. 2 is a fiber of metal cut off the metal by the cutter after the metal 50 has been acted upon by said roller. Fig. 3 is a view of another form of roller, the sharp-edged ribs being separated from one another

by intermediate spaces. Fig. 4 is a strip of metal produced in the same way as indicated with regard to Fig. 2. Fig. 5 is a view of a 55 third form of roller. Fig. 6 is a strip of metal similar to that shown in Fig. 4. Figs. 7 and 8 represent two more forms of rollers. Fig. 9 is a view of a form of apparatus constructed according to this invention. Fig. 10 is a view 60 of another form of apparatus; and Figs. 11 and 12 represent, diagrammatically, two more forms, which will all be described hereinafter.

Fig. 1 shows a roll with cutting-ridges *a*. When this roll is pressed against softer metal, 65 it forms on it corresponding furrows and ridges. Then by means of a flat cutter shavings, Fig. 2, can be cut off corresponding to the furrows in the surface of the roll.

In the roll shown in Fig. 3 the space *b* between two cutting-ridges *c c* is made wider, 70 so that shavings, Fig. 4, can be cut of considerable width relatively to their thickness. Fig. 5 shows a roll with spaces between the cutting-ridges *d*, having in their middle 75 projecting points *e*. By employing this roll shavings can be produced having perforations spaced uniformly along them, Fig. 6. The roll shown in Fig. 7 has longitudinal and transverse cutting-ridges, so that its surface 80 presents projecting points. When this roll is used, powder or dust is cut off the impressed metal fine or coarse, according to the character of the longitudinal and transverse ridges. Fig. 8 illustrates a roll, on the surface of 85 which there are formed incisions of particular shape. Each of these rolls may be made in one piece or may be built up of several pieces of various forms, and their surfaces may be shaped as desired by longitudinal, 90 transverse, or diagonal incisions.

Fig. 9 shows an apparatus for carrying out the process. The metal *g* to be treated is fixed on a chuck *f* and is caused to rotate in the direction of the arrow. Upon a slide-rest *h*, 95 which can be moved toward the work *g*, is mounted the incised roll *i*, which is free to revolve, and a little below it is fixed the cutter *k*. As the work *g* rotates, the roll *i* impresses its face, producing furrows or recesses, 100 with intermediate prominences or ridges, and the cutter *k* cutting these ridges or prominences produces either a filament, shaving, or powder, as the case may be.

As shown in Fig. 10, the work *l* is rotated in the direction of the arrow, while the rolls *m* press against it, forming impressions, the prominences between which are cut off by the cutters *n*.

Fig. 11 shows an arrangement in which the work *o* is stationary. The roll *p* is pressed against the work *o* and is moved in the direction of the arrow, the cutter *q* following it. The roll *p* may have a cutter on each side of it, the one, *q*, operating when traveling in the one direction and the other cutter *r* operating when traveling in the opposite direction, each cutter being arranged to rock on an axis, so that its cutting edge can be raised and lowered. The same device may be employed as indicated in Fig. 12, the work *s* moving while the roll *t* and the cutters *u* and *v* are stationary.

Obviously the work *s* might move in the one direction while the roll *t* and the cutter *u* or *v* moves in the opposite direction. Also there might be several sets of the rolls and cutters arranged to operate on one piece of metal.

Having now described my invention, what I desire to secure by Letters Patent of the United States is—

1. In an apparatus for comminuting metal, the combination with means for supporting the metal to be comminuted, of a roller adapted to produce cavities and elevations in the surface of the metal, a cutter adapted to cut off the parts acted on by said roller, and means for relatively moving the metal and the roller and cutter, for the purpose as described.

2. In an apparatus for comminuting metal,

the combination with means for supporting the metal to be comminuted, of a roller having circumferential ribs adapted to be pressed into the surface of the metal so as to produce corresponding grooves in the same, a cutter adapted to cut off the parts acted on by said roller, and means for relatively moving the metal and the roller and cutter, for the purpose as described.

3. In an apparatus for comminuting metal, the combination with a shaft for supporting and rotating the metal to be comminuted, of a stationary roller adapted to produce cavities and elevations in the surface of the metal, a stationary cutter adapted to cut off the parts acted on by said roller, and means to adjust the roller and cutter relatively to the metal, for the purpose as described.

4. In an apparatus for comminuting metal, the combination with a shaft adapted to support and rotate the metal to be comminuted, of stationary rollers arranged diametrically opposite with regard to said shaft and adapted to produce cavities and elevations in the surface of the metal, stationary cutters, also arranged diametrically opposite with regard to the said shaft and adapted to cut off the parts acted on by said rollers, and means for adjusting the rollers and cutters relatively to the metal, for the purpose as described.

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

FRIEDRICH WILHELM BÜHNE.

Witnesses:

LUDWIG DREIER,
CHRISTIAN WEILBRENNER.