(No Model.)

C. BONNEFOND.

MILL.

No. 525,582. Patented Sept. 4, 1894.

Fig. 1.

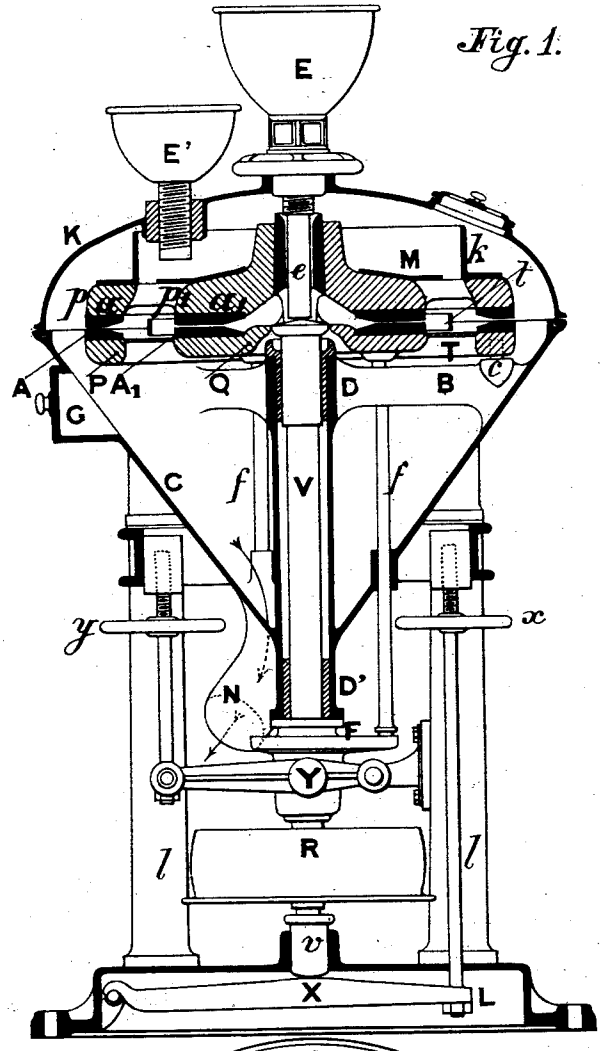
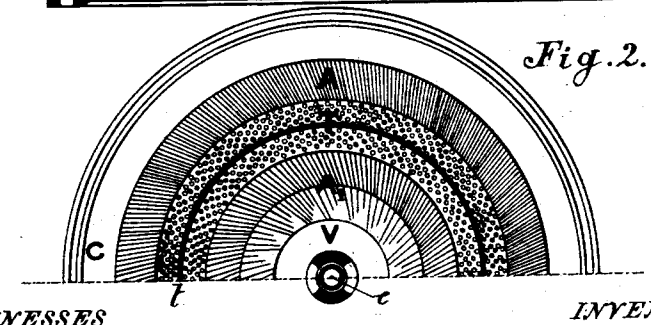


Fig. 2.



WITNESSES

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UNITED STATES PATENT OFFICE.

CHARLES BONNEFOND, OF PARIS, FRANCE, ASSIGNOR TO LA COMPAGNIE FRANCAISE DE MATERIEL DE CHEMINS DE FER, OF SAME PLACE.

MILL.

SPECIFICATION forming part of Letters Patent No. 525,582, dated September 4, 1894.

Application filed August 22, 1893. Serial No. 483,787. (No model.) Patented in France May 27, 1892, No. 221,925, and in Belgium July 11, 1892, No. 100,482.

To all whom it may concern:

Be it known that I, CHARLES BONNEFOND, a citizen of France, residing at Paris, in the Department of the Seine and Republic of France, have invented certain new and useful Improvements in Mills; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The said invention has been already patented in France by Letters Patent No. 221,925, dated May 27, 1892, and in Belgium by Letters Patent No. 100,482, dated July 11, 1892.

The new mill with metallic grinding and bolting surfaces for which I make application for Letters Patent is based in a certain measure on the same principles as the one patented November 3, 1891, No. 462,372, but differs however therefrom in several arrangements which will be hereinafter described.

The object of this invention is to provide for more perfectly carrying out the purposes of the one which forms the subject matter of the aforesaid patent, to which reference is hereby made. To this end the said invention consists in the construction and combination of parts hereinafter particularly set forth and claimed.

Figure 1 is a view partly in section and partly in elevation representing the mill embodying my invention. Fig. 2 is a plan view of the lower stone or fixed plate.

The form of the apparatus is the same no matter if it should serve one or both purposes mentioned.

The pillars or standards of cast iron *l* forming one piece with a common base L support a box C of conical shape, covered with a bulged head or lid K provided with a hopper E. A vertical shaft V in the center of the apparatus is guided in two bearings D and D′ while the lower end rests in a step bearing *v*. On the upper extremity of the shaft V the grinding plate *p p′* in revolving is keyed; the said plate supports the grinding rings which constitute the running stone. Motion is imparted to the shaft by means of a belt pulley R.

The step bearing *v* rests on a lever X the free end of which is hung on the vertical spindle of the hand wheel *x* so that it can be lifted or lowered by turning the hand wheel thereby modifying the distance between the upper revolving plate *p p′* and the lower stationary plate P. The two portions *p′* (the middle) and *p* (the outer ring) are connected together by arms which produce during the revolution a current of air which by blowing between the grinding surfaces accelerates the passage of the goods and prevents heating.

The lower plate P is supported on three pins *c* screwed into three fixed arms cast with the box C and projecting therefrom; it is supported in the center by the bearing D, and rubber washers are interposed so as to give elasticity to the plate and to admit of the passage of hard foreign bodies between the grinding rings.

I shall now consider the features of novelty of the apparatus according to the object of either producing the crushing or fine grinding.

Fig. 1 shows that the crushing surfaces of the apparatus are formed of two rings on each plate *a a′* and A A′. The upper central ring *a′* is fixed with the ring *a* on a single plate *p p′*; but the lower central ring A′ is attached on a central plate Q, separate from the plate P which carries the outer grinding ring A. This plate Q is supported by three vertical rods *f* guided at the top by the arms B and fixed at the bottom in a circular plate F. Rubber rings are likewise provided between these rods and the plate Q, a sieve T is spread over the annular space between the plates P and Q about flush with the grinding rings A A′; it is divided in two zones by a circular partition *t* which leaves between its lower edge and the sieve a narrow passage so that the material driven by the current of air is obliged to crowd between the partition and the bolting surface, thus insuring a perfect sifting. Rakes or scrapers fixed to the upper revolving plate accelerate the passage of the material over the sieve T. The exterior rings A and *a* have of course a dressing finer than A′ and *a′*, their object being to grind finer. The products escaping from between them

fall mixed into the conical box C and come out by the lower mouth N. Then an elevator leads them to an extractor which extracts the groats fit to be worked down, and delivers into bags the flour resulting from the bruising or breaking while the bran is thrown back, passing into another receptacle.

In order to inspect the successive work of the two pairs of rings, an opening has been provided in the sieve T which can be uncovered by passing the hand through the opening G; when the sample is not satisfactory the adjustment is modified till the evil is remedied.

The distances of the grinding rings a' A' and a A are variable independently from one another; to modify the adjustment between A a it is sufficient, as A is fixed, to raise or to lower the upper plate p' p keyed on the shaft V by raising or lowering its step bearing v by means of a hand wheel x. Then the distance between a' and A' can be modified by acting through the medium of the hand wheel y on the lever Y which raises or lowers the crown F and the rods f supporting the plates Q and the rings A'.

The apparatus represented in Fig. 1 can also operate the fine grinding of the grits resulting from the operation of bruising, without submitting it to any modification.

In order to pass from bruising to fine grinding it is sufficient to stop the ingress of the cereals in the central funnel E and the tube e and to pass the granular residue to be ground into the auxiliary funnel E', which will discharge it onto the circular plate M, from whence, by the action of centrifugal force, it will be distributed to the circumferential portions of the outer grinding rings A a. The regulation of this distribution of the material will be effected with extreme simplicity by moving the lower extremity of the hopper E' toward or from the plate M by means of the screw upon the stem thereof, which will admit of the ready elevation or lowering of the same. The grits are chased by the action of the centrifugal force and of the current of air between the outer grinding rings A a, are violently shaken, pressed and rolled against each other and will open by mutual friction and will produce a very fine or rich flour which is round, light and never heated.

The products coming out at N under the conical box C are lifted up to a bolting divider where the flour is separated from the grits not yet reduced; the latter are given up again into the hopper E'.

A sheet guard k, fixed on the crown p prevents the treated material from passing or escaping over the edge of the grinding ring a.

It will be understood from the above description that an apparatus as described with respect to Fig. 1 can be used successively by intermittent periods for the bruising of grain and then for the fine grinding of the grits resulting from the bruising, &c.

Having now described the invention, I claim—

1. In combination with a pair of grinding faces a sieve arranged in the plane of action of the said faces and a circular partition arranged slightly above the said sieve substantially as set forth.

2. In combination with two pairs of annular grinding devices a sieve arranged in the space between the said pairs, and a circular partition also in the said space but slightly above the said sieve substantially as set forth.

3. In combination with the lower fixed grinding rings A A' the upper movable grinding rings a a', the screw threaded rods having hand wheels x y for adjusting the latter rings independently to regulate the fineness of the grinding, the lever X acted on by hand-wheel x and supporting the upper grinding ring a and the lever I which is acted on by the hand wheel y and supports the ring a' substantially as set forth.

4. In combination with the centrally arranged main hopper E and the casing which supports the same, the hopper E' also supported by said casing, but discharging into the same on one side of the center thereof, outlets for the ground material, two pairs of concentric grinding rings arranged within the said casing between the said hoppers and outlets and a sieve arranged between the said pairs of rings substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES BONNEFOND.

Witnesses:
ROBT. M. HOOPER,
LOUIS LOCHERT.