

(No Model.)

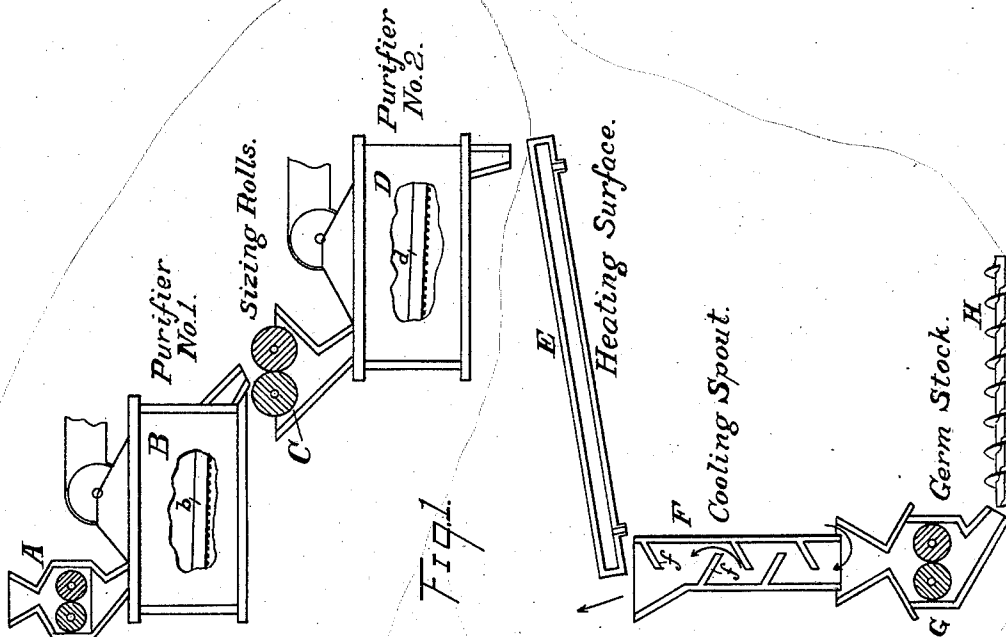
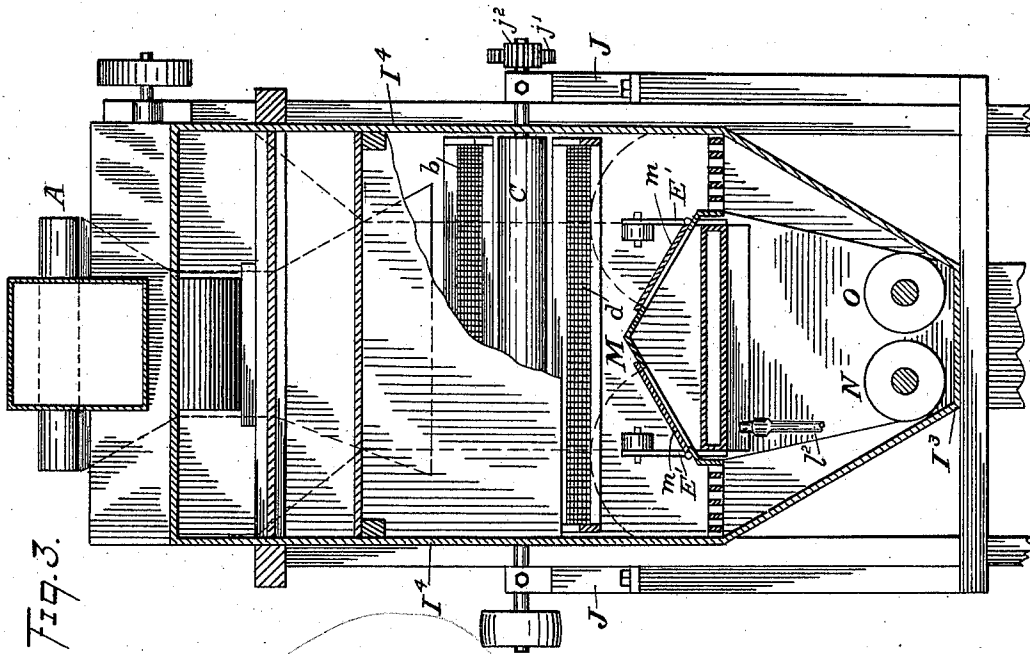
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PROCESS OF AND APPARATUS FOR MANUFACTURING FLOUR.

No. 580,834.

Patented Apr. 13, 1897.



Witnesses
Julian E. Woodwell.
E. S. Poole.

Inventor
Charles Orville Wright.
By *Frankland James*
His Attorney

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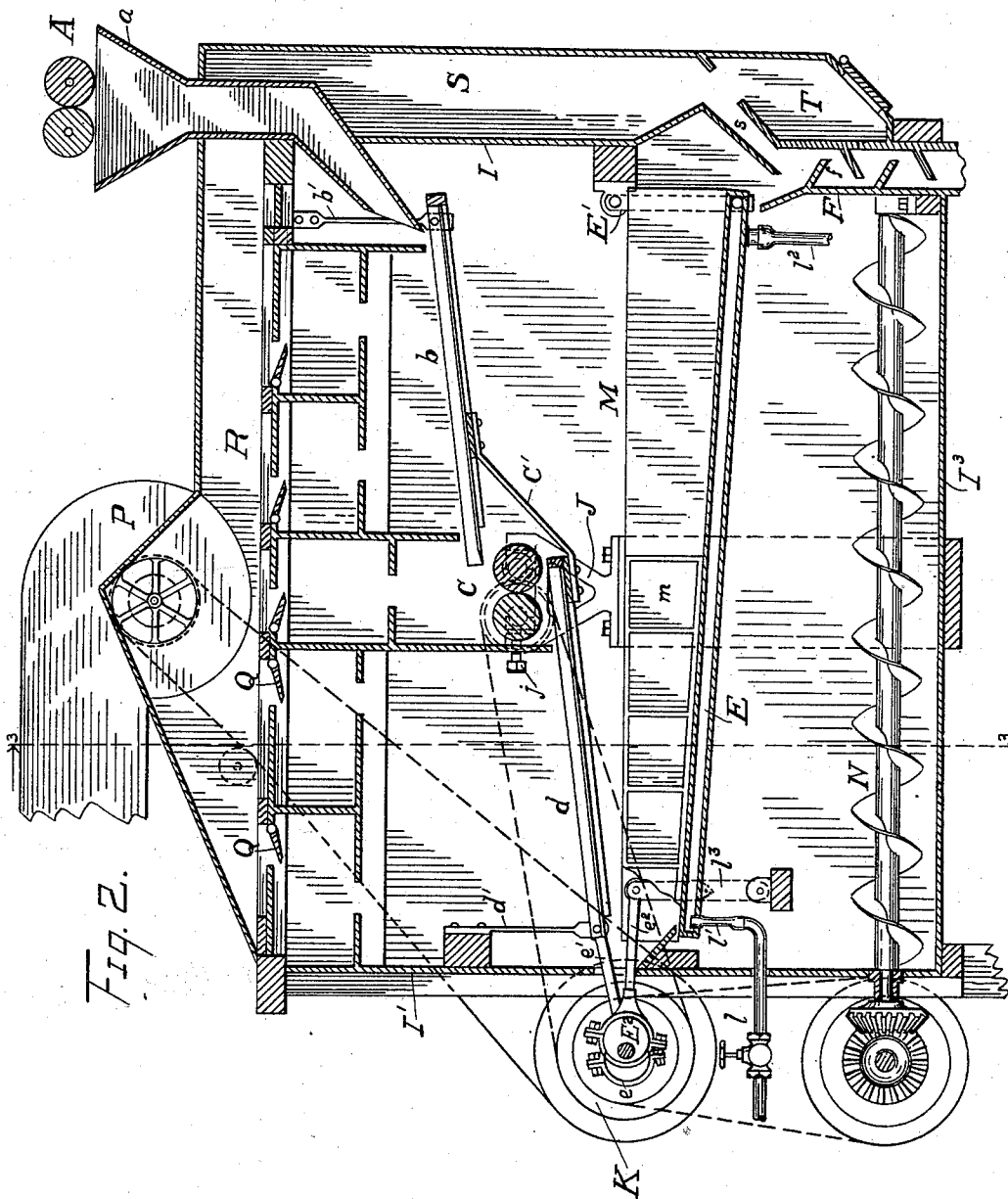


Fig. 2.

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UNITED STATES PATENT OFFICE.

CHARLES ORVILLE WRIGHT, OF BLUEFIELD, WEST VIRGINIA.

PROCESS OF AND APPARATUS FOR MANUFACTURING FLOUR.

SPECIFICATION forming part of Letters Patent No. 580,834, dated April 13, 1897.

Application filed November 19, 1896. Serial No. 612,720. (No model.)

To all whom it may concern:

Be it known that I, CHARLES ORVILLE WRIGHT, a citizen of the United States, residing at Bluefield, in the county of Mercer and State of West Virginia, have invented certain new and useful Improvements in Processes of and Apparatus for Manufacturing Flour, of which the following is a description, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon.

My invention comprises a new and improved process of or method in the manufacture of flour from wheat or other grain; and it consists in a new process or method, and also comprises novel features of apparatus in connection therewith.

In the standard and well-known process of manufacturing flour the object of the miller is to secure as nearly as possible all of the white starchy particles of the wheat-berry, rejecting all parts thereof which are not white in color and which would therefore tend to lower the commercial value of the product. This results in the production of flour which is almost pure white starch, the parts containing the albuminoids and phosphates being carefully rejected in order to produce the whitest possible flour.

My object, on the contrary, is to produce a flour containing as nearly as possible all of the food products of the wheat-berry, rejecting only the outer covering, including the bran and fuzz and the dust which may be contained in the crease. My improved flour is not quite as white as can be produced by the well-known roller process of the present day; but it is a vast improvement thereon, since it contains the albuminoids, phosphates, and other products which are of great value as food and which are contained in the germ and in the albuminous coating next to the bran. My product cannot be made in the ordinary mill for the reason that the germ contains an oily substance which remains in a comparative soft and doughy condition, so that it, the germ, cannot be pulverized under ordinary conditions—that is, conditions under which the remaining inner portion of the berry is pulverized into flour, and consequently this portion of the wheat-berry is usually wasted

or disposed of as feed. My object is to save this portion of the kernel and to ultimately pulverize it and combine it with the rest of the flour, so that the flour when completed shall contain everything in the kernel except its outer covering. I contemplate also making a special flour which will contain a larger percentage of the phosphates and albuminoids than contained in the berry.

In carrying out my invention the grain is thoroughly cleaned in any of the well-known ways and is then broken or crushed in any suitable mill, and then sent as middlings to a purifier in the usual course. The middlings passing through the purifier are treated in the usual manner, the germ-middlings passing off and containing most, if not all, of the germs in a practically whole state. This material is then passed through a pair of suitably-adjusted sizing-rolls for the purpose of flattening the germs, so that they will not pass through the next sieve and also of further reducing the middlings. The material from the sizing-rolls is then passed through another purifier for the purpose of further extracting the flour particles, after which the said material containing the flattened germs, bran, &c., passes over a heated surface, in traversing which the germs are thoroughly heated. The material passes across or under or through this heating device, during which travel the flat, soft, doughy germs are heated to such an extent that upon meeting a current of cold air after leaving the heater these particles, which before were soft and doughy, now become brittle and can be pulverized. The bran is also heated, which tends to reduce its specific gravity.

From the heater the material containing the flattened germs passes down an aspirator-leg or chute provided with oppositely-inclined shelves to break the fall of the material. A current of cool air passes constantly up the said chute and through the descending material, thereby carrying off the bran and lighter particles and also cooling the flattened germs, thereby rendering them brittle. From the chute the cooled and purified germs pass to a grinding-mill, where they are reduced to flour, and this flour is then added to the portions previously separated, making a com-

plete compound the same as in the wheat-berry minus the bran and dirt. In case any of the albuminous or glutinous coating has adhered to the bran this is also carefully separated and after bolting is also returned to the flour.

It will thus be seen that the object of my invention is to produce a flour which will contain all of the albuminoids and phosphates found in the wheat-berry, most of which are rejected in the ordinary methods of milling. I also reject the bran and produce the highest grade of flour, which, instead of being almost pure starch, like the fine white flour of commerce, contains the most valuable food products of the wheat-berry and is wholesome and nourishing to the highest possible degree.

My improved process may be carried out by the use of widely-differing mechanism. For instance, the germ-middlings might be heated in any simple contrivance "by hand," so to speak, then pulverized and returned to the stock in any convenient manner known to the miller. The process, however, would remain the same, and this I claim broadly. I have, however, devised an apparatus especially suited to the production of my improved flour and in a simple and continuous manner. The use of this particular apparatus, however, is not essential.

In the accompanying drawings, Figure 1 is a diagrammatic representation showing the means employed in carrying out my invention. Fig. 2 is a transverse sectional elevation of a combined purifying and treating apparatus. Fig. 3 is a transverse sectional end view on the line 3 3 of Fig. 2.

As indicated in Fig. 1, A is a set of rolls supplying stock to a purifier B, which is marked "Purifier No. 1." From this device such portions of the stock are removed as are suitable for use without special treatment. Almost all of the germs are contained in the material passing from the tail of purifier No. 1, and this material passes then through a set of sizing-rolls C, in which the remaining flour particles are further pulverized and the germs are flattened, so that they cannot pass through the sieves of purifier No. 2, which is marked "D" and which is supplied by the sizing-rolls C. A further portion of the flour particles are removed in the passage of the material through the purifier D, the tailings from which are composed principally of flattened germs and bran. This then passes to a heating-surface E, which is heated in any convenient manner and should be kept in vibratory motion or provided with traveling scrapers to assist in the passage of the material over its surface, during which it becomes thoroughly heated. This heating lessens the specific gravity of the bran and similar substances and so affects the flattened germs that when subjected to a current of cold air they become hard and brittle and can be pulverized. From the heating-surface the material containing the heated germs

drops into a vertical chute F, up which a current of cold air is passing, as indicated by the arrows, Fig. 1, and this chute is by preference provided with a number of projecting ledges *f*, so that the material will drop from one to the other, delaying its descent. During the passage down the chute F the material becomes separated, the germs being much heavier than anything else continuing to descend, while the bran and lighter substances are sucked up by the current and carried off. At the bottom of the chute is placed a pair of rolls G, which receive the cold and now brittle flattened germs and pulverize them, when they are delivered to a conveyer H in the form of germ-stock, which is then mixed with a suitable portion of the starchy part of the flour to make a flour ordinarily representing the entire product of the wheat-berry less the outer flinty coating known as "bran," and containing all of the albuminoids, phosphates, and other valuable constituents of the wheat-berry, and all that goes to make up the perfect food which whole wheat is well known to contain.

The above-described apparatus is shown in conventional form, and of course in the operation of milling the well-known apparatus may be used, the only special means which I employ being so simple that it may be embodied in numerous different forms without in any way departing from the invention. I have, however, devised an organized apparatus well adapted to the purpose, which is illustrated in Figs. 2 and 3, in which (see Fig. 2) I have shown a combined double purifier and heating and cooling apparatus.

I¹ are the ends of a large rectangular chamber. I³ is the bottom thereof. I⁴ I⁴, Fig. 3, are the sides.

A indicates a pair of feeding-rolls supplying a spout *a*, the material from which passes on to sieve *b*, which is represented by purifier No. 1 in the diagram.

d is a second sieve mechanically connected, as by brace C', so that the two sieves will move together. The sieves *b d* are supported by straps *b' d'*, and vibrating motion is imparted to them from eccentric *e*. The sieves are to be provided with the usual cleaning-brushes. (Not shown.) I have also omitted some other details relating to the purifier as such and which, being well known, seem to be unnecessary.

C is a pair of sizing-rolls interposed between the tail of sieve *b* and the head of sieve *d*, said sieves being arranged in different planes. The sizing-rolls receive the tailings from sieve *b* and deliver the crushed material at the head of sieve *d*. These rolls are mounted in suitably-supported metallic yokes J J and are provided with adjusting-screws *j*, being also suitably connected by differential gearing *j' j'*, Fig. 2. One of the rolls is driven by suitable belt from pulley K, and the ratio of speed of said rolls may be as desired.

E is a heating-surface for specially treat-

ing the flattened germs, as stated, and it secures the tailings from the second sieve or purifier *d*, which contain substantially all of the germs, together with the bran.

5 The heater extends longitudinally of the machine, as indicated, and may be arranged to vibrate, as shown. It may, however, be stationary and the material be moved over its surface by mechanical means without in any way departing from the invention.

10 As shown, *E* is a hollow metallic table heated by steam, hot air, or water, which table extends longitudinally of the machine and is located at any suitable distance below the 15 sieves, and is supported at its lower end by a hinged strap *E'* and by the inverted strap or rocker-arm *E''* at its upper end. Vibrating motion is communicated to the table *E* from eccentric *E²* by arm *e²*, connected to the rocker 20 *E'*. Where steam or hot water is used to heat the heating-surface *E*, it may be introduced through pipe *l*, which is connected to the table *E* by a flexible section *l'* of steam-hose. A suitable waste-pipe *E³* is provided and led 25 to the outside of the machine.

M is a hood or cover for the heater *E* and is attached to the framework and sustained independent of the table *E*, since it need not vibrate therewith. The cover *M* is of substantially *V*-shaped form and comprises any 30 desired number of separate hinged doors *m* on either side, so that by opening or closing any number of the doors *m* any portion of the material falling through the sieves *b d* may be directed to the heater in addition to 35 the tailings of the sieve *d*, which pass thereto entire.

The heater *E*, together with its cover, is narrower than the width of the machine, so that where the doors *m* are closed the material passing through the sieves *b d* can drop 40 down past the heater to the bottom of the machine in which are located conveyers *N O* of the usual type and arranged and operated in any well-known manner.

45 *F* is the chute, the upper end of which receives the tailings from the heater *E*, and said chute is provided with incline shelves *f*, so that the descent of the heated material will be delayed.

P is an exhaust-fan located on top of the machine and connected therewith.

50 *Q Q* are adjustable air-valves for regulating the upward current of air through the machine, said valves opening into the box *R*, from which the air is exhausted by the fan *P*.

S is a wind-trunk connected with box *R* and communicating with and sucking the air up through the chute *F* through opening *s*.

60 *T* is a vacuum-chamber at the foot of the wind-trunk and below the opening *s* for receiving such of the heavy particles as might otherwise be carried up the wind-trunk and pass through the fan *P* and be wasted. The rolls *G*, to which the chute *F* discharges, are 65 not shown except in Fig. 1.

From the foregoing it will be understood

that the material from the rolls *A* is delivered to the chute *a* and thence to the first sieve *b*, where the process of purifying by air-currents is carried on contemporaneously 70 with the sifting out of the good flour particle, the remainder of the semolina passing through the rolls *C*, which further reduce the stock and also flatten the germs, the sized material 75 dropping upon the head of sieve *d*, where it is further separated and purified. The material passing through both the sieves *b* and *d* may drop in the usual manner directly downward to the conveyers *N O* to be disposed of 80 as usual. The tailings from the second sieve *d* pass directly to the heater *E*, after traversing which they fall into the cooling-chute *F*, where they are further separated by an upward current of air, leaving only the flattened, 85 heated, and then cooled germs to pass to the rolls *G*, where they are ground into flour. This germ-flour, which I claim to be a new product, is then disposed of by mixing with a suitable portion of the regular white starchy 90 flour to make my improved flour. The hood *M*, placed over the heater, enables me to carry on the process of purification in the regular way, together with that of the heating and cooling of the germs separately; but by 95 means of the hinged doors *m* I may, on occasion, divert any portion of the purified flour to the heating device where such admixture appears desirable. In connection with the final reduction of the heated and cooled 100 germs it must be understood that the invention is not limited to the absolute flattening out under all circumstances of each and every germ, since where the germ has been heated and then suddenly cooled it becomes 105 brittle and can be reduced with or without an admixture of flour.

The above-described apparatus may be modified in various ways by those skilled in the art in view of the foregoing description 110 without the exercise of invention. I therefore do not limit myself to the exact details of construction or arrangement.

Having now described my invention, what I claim is—

1. As a new article of manufacture, a food product containing all of the berry to be treated except its outer coating and including all the albuminoids and phosphates, together with the germ in a finely-divided condition. 115 120

2. The herein-described process or method of making a dry, fine flour possessing good keeping qualities, from soft, oily germs of grain which consists in first separating the 125 germ from the flour particles, then heating the germ and thereby evaporating oleaginous substance therefrom, then cooling the heated germs and thereby developing brittleness and friability, and then grinding. 130

3. The herein-described process or method of making a dry fine flour possessing good keeping qualities from the germs of grain, which consists in first flattening the soft oily

germs, then separating the flattened germs from the flour particles, then heating the flattened germs and thereby evaporating oleaginous substances therefrom, then subjecting
 5 the hot germs to a current of cool air and thereby developing brittleness and friability, then grinding.

4. The herein-described method or process of making germ-flour which consists in, first
 10 separating the germ from the wheat, then heating the germs, then rapidly cooling the heated germs, and then passing through grinding-rolls with an admixture of flour-stock.

15 5. The herein-described process of pulverizing the germs of wheat which consists in, first separating the germ from the wheat, then flattening the germs and heating them, then cooling the heated germs, then passing the
 20 same through grinding-rolls with an admixture of flour particles.

6. The herein-described process of making flour containing all the constituents of the berry except its outer covering which consists
 25 in first crushing the grain, then purifying the same, then passing the tailings containing the germs through sizing-rolls to flatten the germs, and then heating said flattened germs and separating them from the remainder of
 30 the tailings, then cooling said germs and pul-

verizing the same and adding the germ-flour to the remainder of the flour.

7. The combination with a duplex purifying apparatus, of an inclosed heating device within the same, means for passing the tail- 35 ings of the second purifier over the heater apart from the purified flour, and a cooling device arranged to receive the tailings of the heater.

8. The combination of a middlings-purifier, 40 a pair of sizing-rolls adapted to receive the tailings therefrom, a second purifier fed from the sizing-rolls, an inclosed heater arranged to receive the tailings from the second purifier, a cooling and separating chute adapted 45 to receive the tailings from the heater, and a pair of crushing-rolls arranged to receive the cooled product from the chute.

9. The combination with a duplex purifying apparatus, of a pair of sizing-rolls be- 50 tween the sieves, a heater for heating the tailings from the second sieve, a cooling device arranged to receive the material from the heater, and suitable grinding mechanism.

In testimony whereof I hereto affix my signature in presence of two witnesses. 55

CHARLES ORVILLE WRIGHT.

Witnesses:

I. B. AUSTIN,

ELLA V. HEPTINSTALL.