2 Sheets—Sheet 1.

G. A. BUCHHOLZ.

Manufacture of Flour.

No. 97,038. Patented Nov. 23, 1869.

Fig. 1

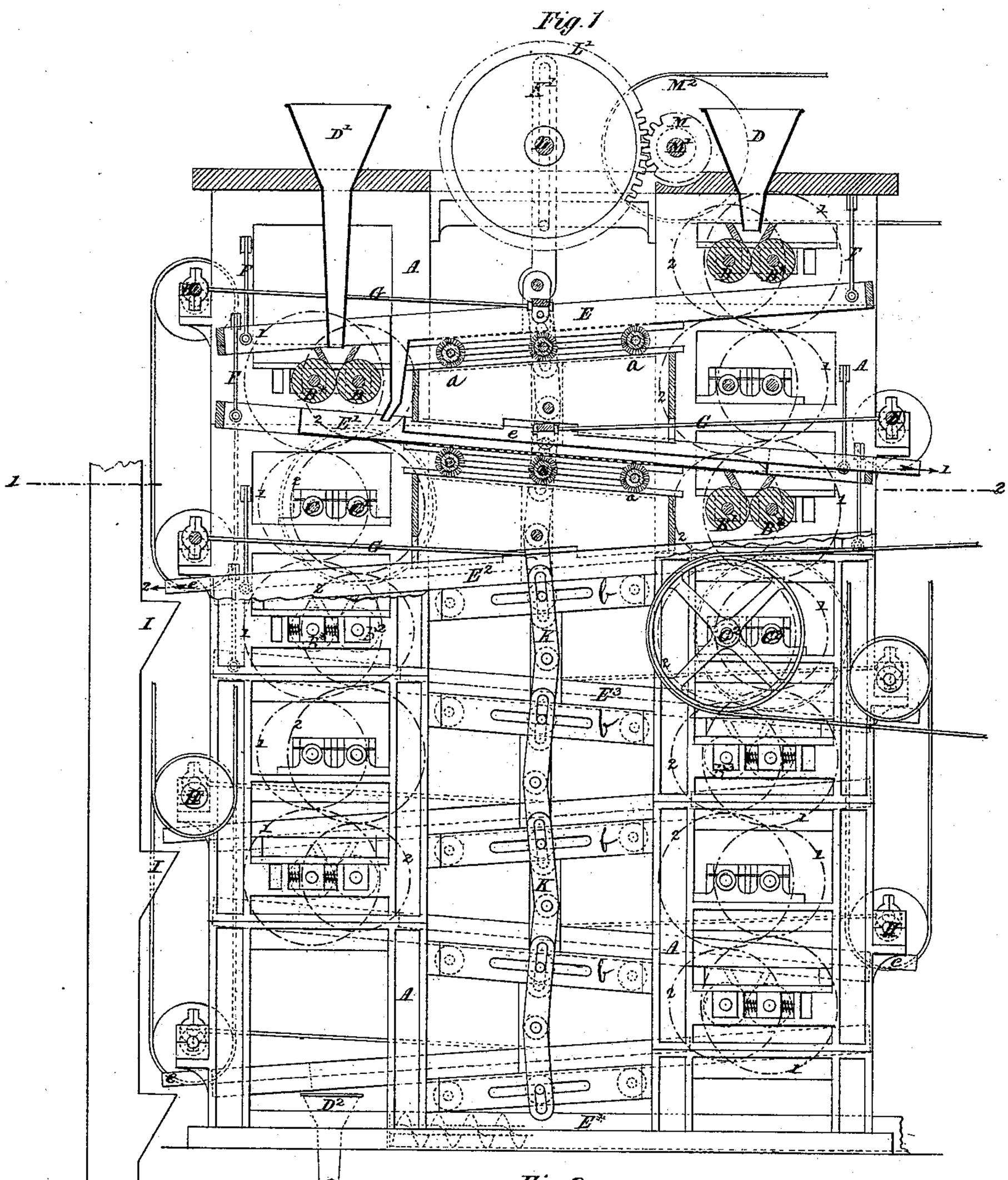
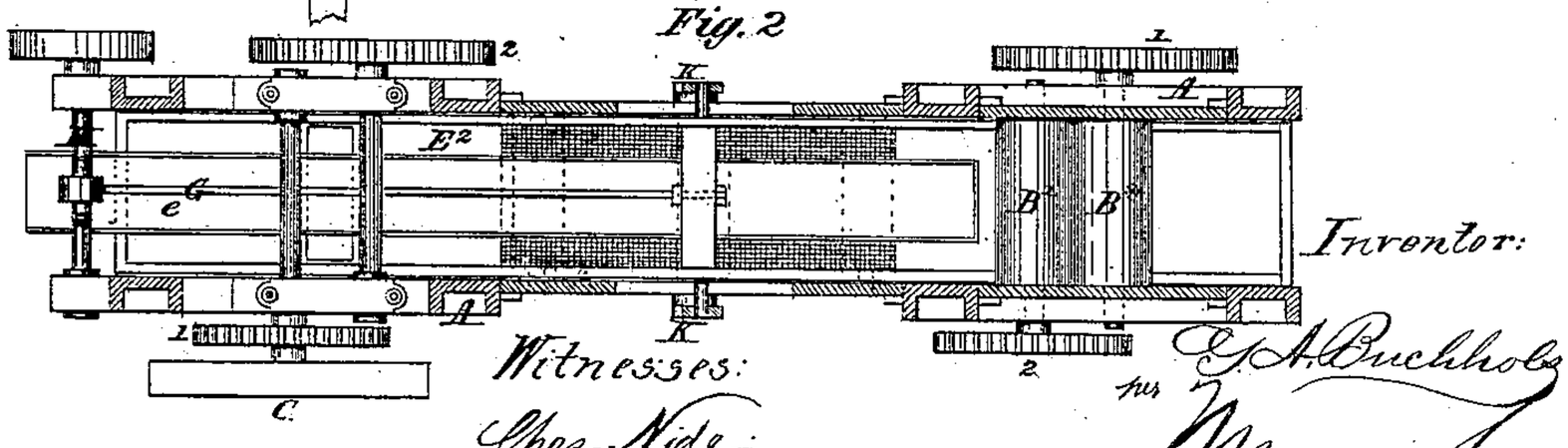


Fig. 2



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2 Sheets—Sheet 2.

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Fig. 3

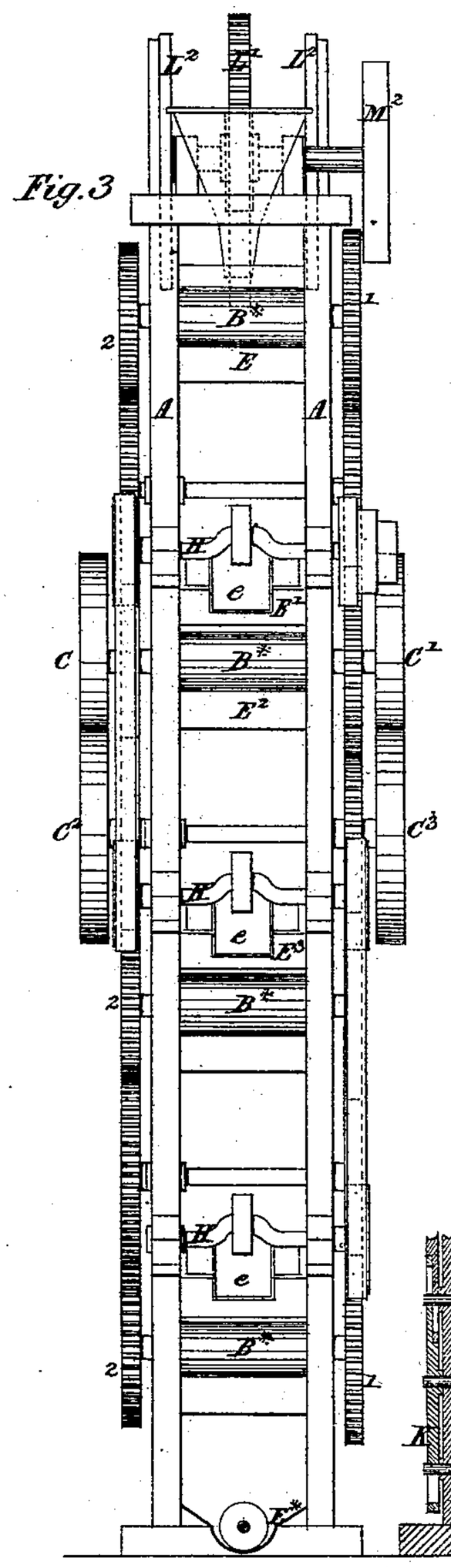


Fig. 3*

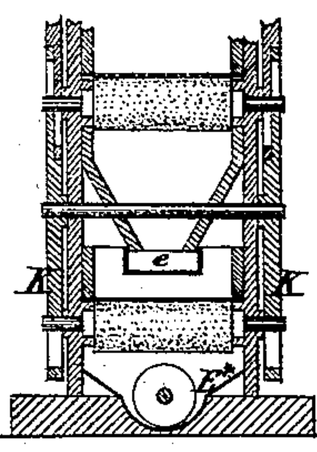
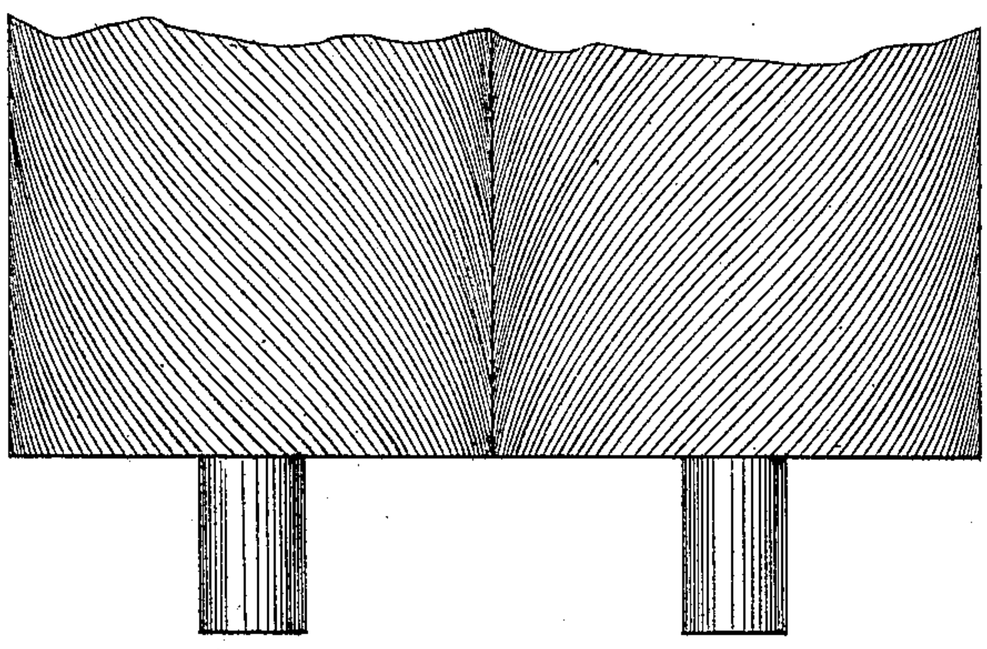
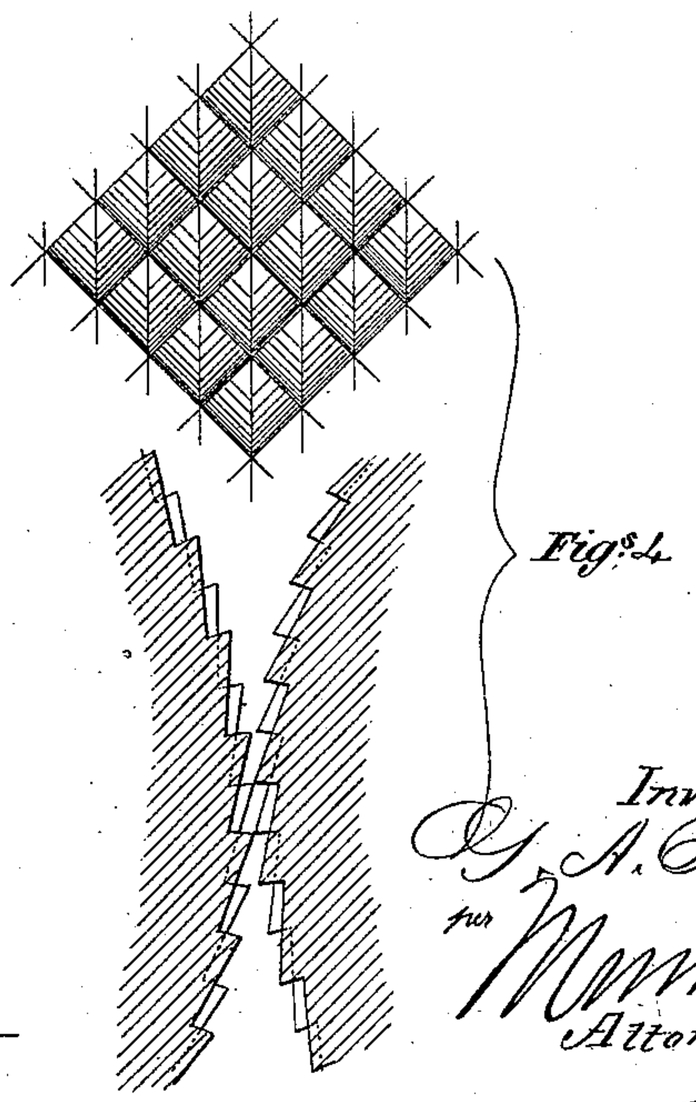


Fig. 5





Figs. 4

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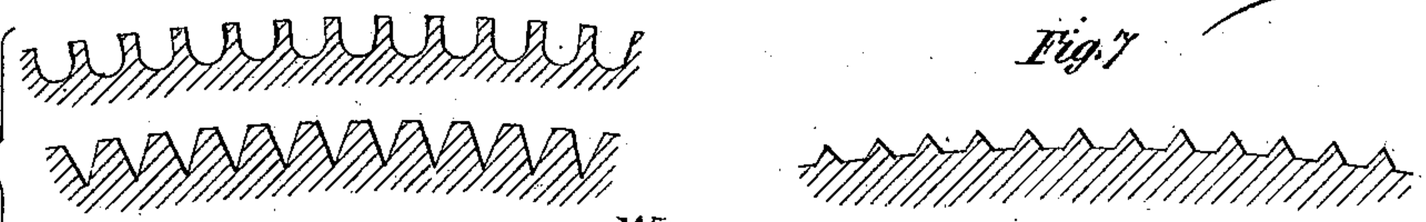
Fig. 7

Figs. 6



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UNITED STATES PATENT OFFICE.

GUSTAV A. BUCHHOLZ, OF SHEPHERD'S BUSH, COUNTY OF MIDDLESEX, ENGLAND.

IMPROVEMENT IN MACHINERY FOR MANUFACTURING SEMOLINA AND FLOUR.

Specification forming part of Letters Patent No. **97,038**, dated November 23, 1869.

To all whom it may concern:

Be it known that I, G. A. BUCHHOLZ, of Shepherd's Bush, county of Middlesex, England, have invented a new and useful Improvement in Machinery for Manufacturing Semolina and Flour; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification.

The invention relates to a novel arrangement of apparatus for reducing hulled wheat to semolina, which apparatus, by slight modifications, may be used to reduce the same to flour, the object being to effect such operations rapidly, and when designing to manufacture semolina to produce it with concurrent formation of a minimum proportion of flour or wheat-dust. I also design to economize space in the mill by rendering the apparatus more compact than heretofore. To attain these ends I mount in a suitable frame, say, seven pairs of cutting-rollers, (less or more may, if desired, be employed,) arranged in two vertical lines, and these lines of rollers I connect together by means of inclined troughs, which severally serve to lead that portion of the cut material that is not sufficiently reduced from one pair of rollers to the next lower pair, whereby it is subjected to successive cutting operations until the last pair completes the reduction of the corn. To allow of this traverse of the divided grains of corn, each pair of cutting-rollers is mounted at a different elevation, the first pair of the series being at the highest and the last pair at the lowest level. The inclined troughs I fit with bottoms of wire-gauze or other suitable reticulated substance, in order that they may act as sieves and discharge the semolina as quickly as it is manufactured, and to keep open the meshes or holes I use traveling rotating brushes, which will run to and fro under the gauze or perforated metal and brush out any cut grains or semolina that may adhere to the wires or metal.

In Sheet I of the accompanying drawings, Figure 1 represents, partly in side elevation and partly in section, the improved arrangement of machinery for reducing wheat to semolina. Fig. 2 is a sectional plan taken in the line 1 2 of Fig. 1. Fig. 3, Sheet II, is an end elevation; and Fig. 3* is a partial transverse section of the same.

Similar letters of reference indicate corresponding parts.

A A is the main framing, fitted with guides and bearings to receive the stationary and sliding axle-boxes of the pairs of cutting-rollers B B. These rollers are grouped in two sets and arranged in two vertical lines at opposite ends of the framing. The adjustable rollers B* of each set are all geared together by means of intermediate spur-wheels gearing into spur-wheels keyed onto the axle of the several adjustable rollers. The lines of this gearing are indicated in Fig. 1 by dotted circles marked 1 1 1. In like manner the stationary or non-adjustable rollers B of each set are all geared together by the aid of intermediate spur-wheels, and the pitch-lines of this set of gearing are indicated by dotted circles marked 2 2 2. Each one of these four sets of gearing is independently driven, and to allow of this the pulley-shafts C, C′, C^2, and C^3 are provided. I prefer that one roller of each pair shall have a speed from four to six times greater than that of the other roller, as a good cutting action in contradistinction to a crushing action is thereby secured. The uppermost pairs of rollers at either end of the machine are cross-cut ripping-rollers, after the pattern shown at Fig. 1, Sheet I, and described in the application I^a, filed in the Patent Office simultaneously with this application, for the improvements contained in which application I am seeking Letters Patent concurrently with this invention. Leading down to these rollers are the hoppers D D′, for feeding the hulled grain thereto. The blades to be converted to semolina may be hulled in any suitable hulling-machine; but I prefer that which has its case and rotary drums fitted with vertical steel blades as friction-surfaces. The grain after passing under the action of the ripping-rollers, which divide it up with little or no tendency to reduce portions to powder, is received onto the first of a series of inclined troughs, E E, by which the grain in its divided state is led to the several pairs of grooved cutting-rollers in succession. These rollers may be grooved in lines parallel to their axis or helically, as shown at Fig. 5, Sheet II. The sectional form of the groove is of comparatively

little importance, (as either of the forms shown at Fig. 6 will produce good work;) but by grooving the cutting-rollers helically I lengthen the time of contact between the grains and the acting surface of the rollers. This enables me to set the rollers much farther apart than if they were furnished with grooves cut parallel to the axis of the rollers, and thereby to obtain a more rapid delivery of the semolina.

I may here remark, to show the importance of helical grooving, that in working with rolls ribbed parallel to their axis a thin feed is required, as the rollers have to be set at a distance from each other equal to about one-third of the size of the semolina required; but when the rollers are helically grooved they will take a heavy feed, as they are set apart a distance equal to the size of semolina required, and they will consequently deliver rapidly.

The troughs E are carried, like ordinary "shakers," by pendent springs F, made fast to the framing and secured by bolts to the opposite ends of the troughs. They receive an endwise motion by their connection, through rods G, with crank-rods H, situated at opposite ends of the machine. The crank-rods at one end of the machine are driven from one shaft by means of bands and pulleys, (see Fig. 1,) and another shaft with bands and pulleys is used to drive the crank-rods at the other end of the machine. The first trough, E, leading from the highest rollers, is formed with a reticulated bottom, and it terminates at its lower end in a chute which leads so much of the ripped grain as is too large to pass through the holes in the bottom of the trough down to the trough E′. This trough is hung just below the second pair of ripping-rollers, and here the two feeds combine, passing off by the trough E′ to the first of the pairs of grooved cutting-rollers. Any semolina that may be formed by the first pair of ripping-rollers will fall upon a tray, *e*, with which the trough E′ is fitted, and, sliding down that tray, will be discharged in the direction of the arrow 1, Fig. 1, into a chute, whence it may be conveyed away to any suitable receptacle. The ripped grain, as it falls between the first pair of grooved cutting-rollers B′, will be converted in part into semolina, which will pass out of the machine by the tray *e* in the trough E^2, as indicated by the arrow 2. Chutes I (see Fig. 1) may be provided for receiving and conveying away the products of the machine. The portions of the grain not sufficiently reduced to pass through the holes in the trough will now be discharged between the second pair of helically-grooved cutting-rollers, B^2, and the like assorting or sifting action will then take place in the trough E^3, and so on throughout the series, the last portion of the semolina being discharged into a stationary trough, E*, fitted with an Archimedean screw for delivering it therefrom. Any refuse bran that may still be kept back by its inability to pass through the holes of the last sifting-trough is discharged into a hopper, D^2.

In order to keep open the holes or meshes in the bottom of the troughs E, cylindrical brushes are employed to traverse to and fro under the troughs and brush out any obstructions to the descending semolina. These brushes are mounted on axles in groups of three, which turn freely in square boxes mounted in guides formed on the inner face of the side frames of the machine. The axle-boxes of each set of brushes are connected together by tie-rods, and the middle axle of each set of brushes is continued through elongated slots in the side frames, in order that both ends may enter vertical slots in a vertical arrangement of rock-levers, K, at the opposite sides of the framing. These levers are each mounted on a fixed fulcrum, and they are slotted at their opposite ends to receive the elongated brush-axles, and they are made of sufficient length to overlap each other and bring a portion of their respective slots into coincidence. The ends of the axles serve as loose connecting-pins to the levers, which are all moved from one source of motive power.

At the top of the machine is mounted a transverse shaft, L, to which is keyed a spur-wheel, L′, and in gear with this wheel is a pinion, M, keyed to a transverse shaft, M′, which receives a rotary motion for the purpose of driving the shaft L through a driving-band applied to the pulley M^2.

Keyed to the opposite ends of the shaft L are crank-plates L^2, the crank-pins of which enter slots in rock-levers K′, which are mounted on fixed fulcra, and are coupled with the rock-levers K by the elongated axle of the top set of brushes. It will now be understood that as the crank-plates rotate they will cause the levers K′ to rock, and these levers, by reason of their connection with the lines of rock-levers, will cause the whole to oscillate simultaneously, and thereby give a transverse motion to the brushes in their guides. For the purpose of conducting the semolina onto the trays, fixed inclined boards are provided, as shown in the cross-section at Fig. 3*.

I would here remark that when I desire to produce flour by the above-described machinery all that is necessary is to introduce cutting-rollers with finer grooves, which may be either parallel to the axis or arranged helically, and to provide proportionately finer sieves or wire-cloth for the bottoms of the troughs. The relative speeds of the cutting-rollers of each pair will be about six to one.

The sectional form of grooves which I employ will be comparatively unimportant; but that which I prefer is shown at Fig. 7, Sheet II.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The method of manufacturing semolina by passing the grain through successive pairs of ripping-rolls and sifting out the finer parts between each pair, in the manner described.

2. The arrangement between the sets of rollers of shaking perforated troughs E E′ E^2 E^3, inclined alternately in opposite directions,

to carry the fragments of grain and to sift the fine dust through, in the manner described.

3. The combination of inclined and perforated shaking troughs E E′ E² E³ with trays *e* to carry the pulverized grain.

4. The cylindrical brushes *a*, arranged with respect to the perforated troughs E E′ E² E³ of a flour-mill, and operating in the manner described.

5. The axles and axle-boxes of brushes *a*, connected together in sets by tie-rods, in combination with slotted frames *b*, and slotted rock-levers K, having fixed fulcra, and operated by crank-plates L, in the manner described, to give a transverse motion to the brushes in their guides.

The above specification signed by me this 12th day of July, 1869.

G. A. BUCHHOLZ.

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