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H. J. & G. A. GILBERT.

ROLLER MILL.

No. 263,164. Patented Aug. 22, 1882.

Fig. 1.

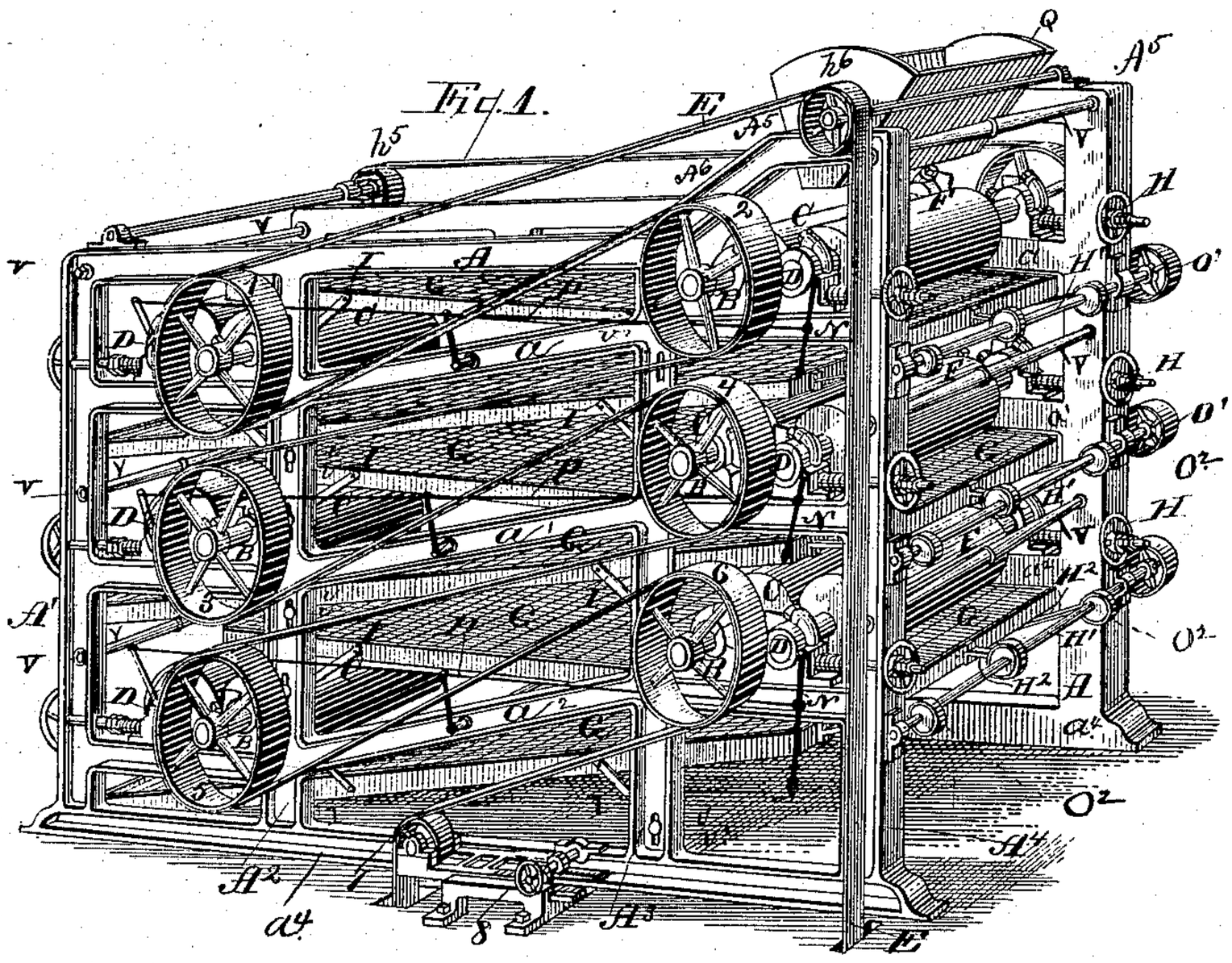

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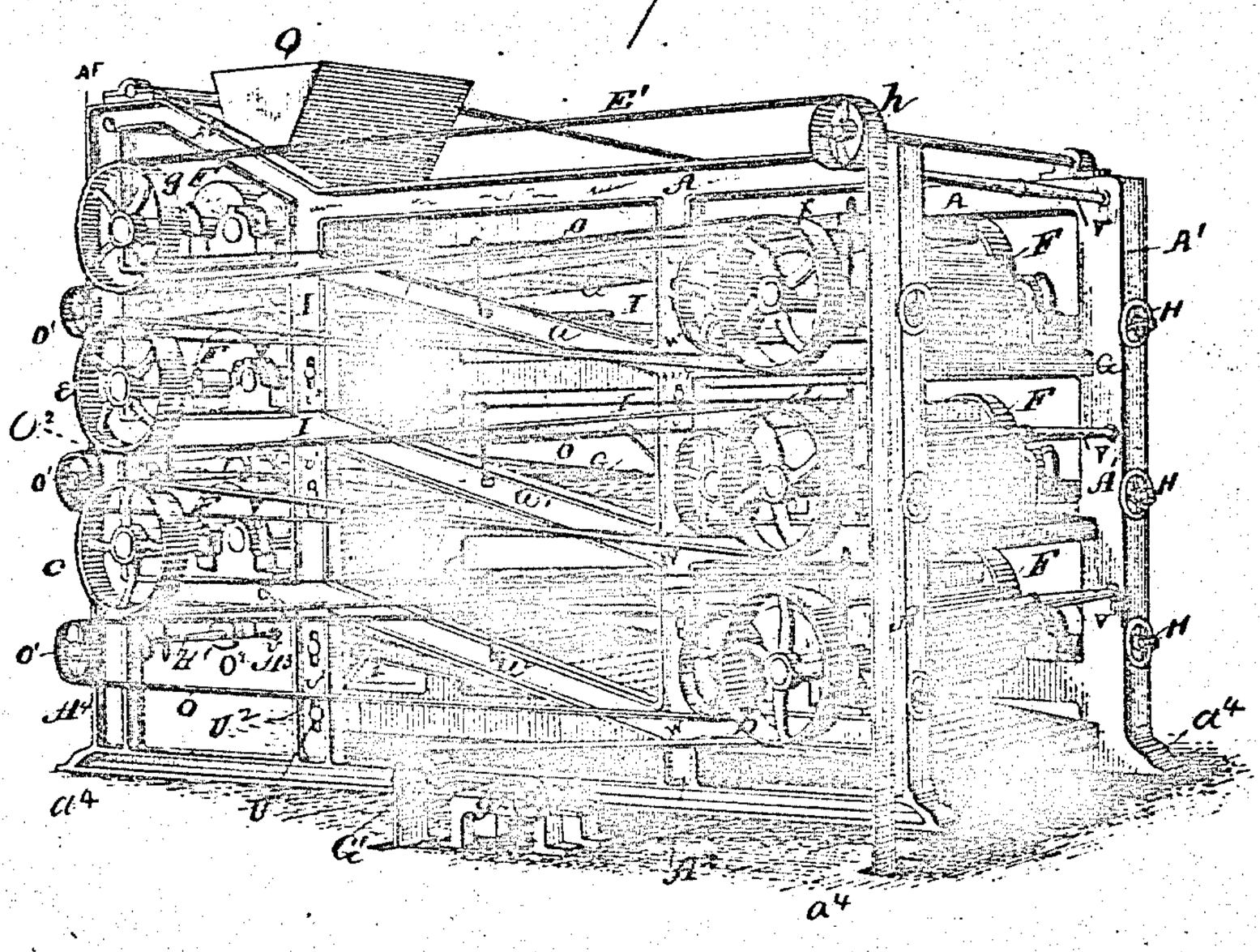
Fig. 2.



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4 Sheets—Sheet 3.

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ROLLER MILL.

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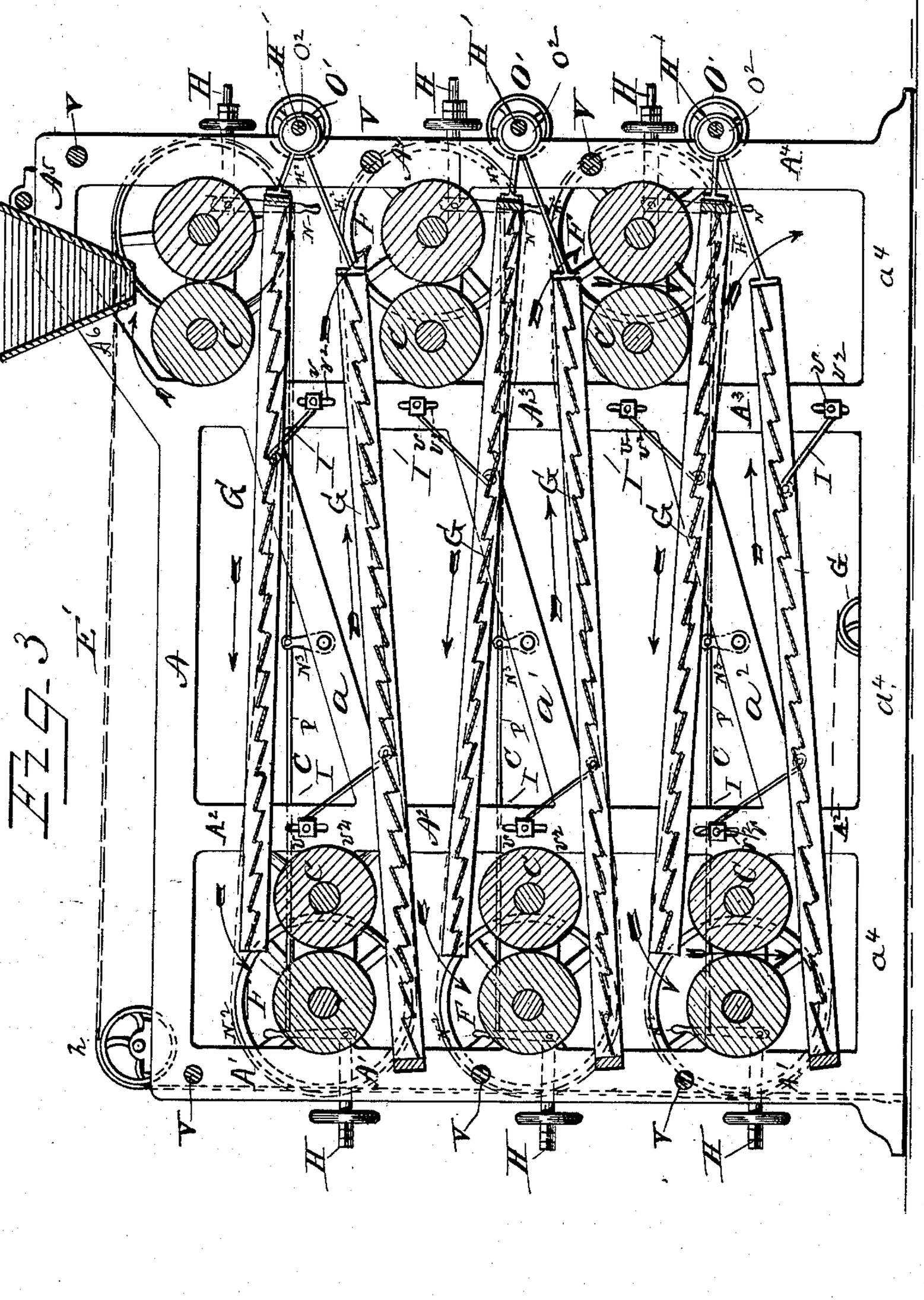

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ROLLER MILL.

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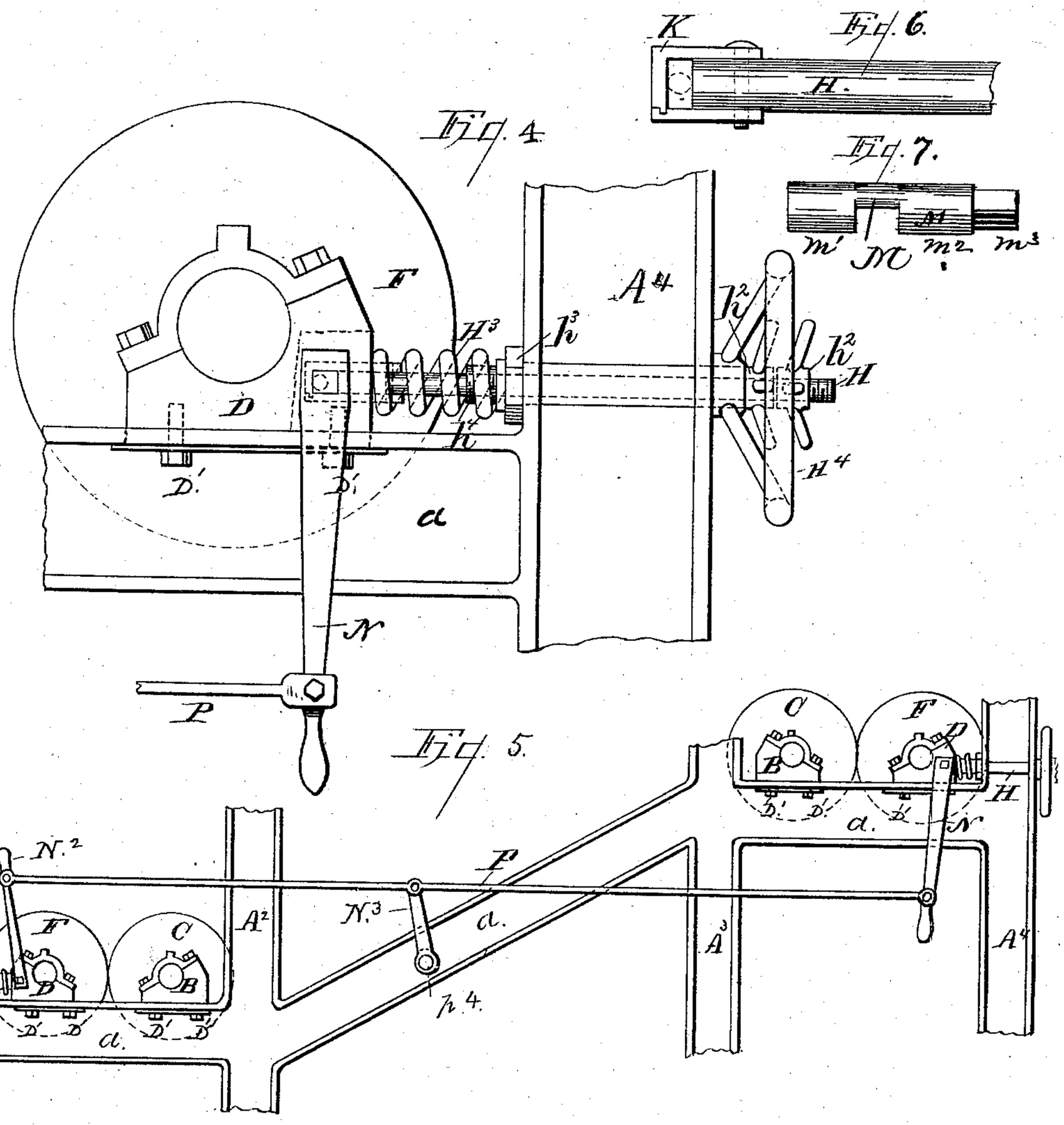

Fig. 6.

Fig. 7.

Fig. 4

Fig. 5.

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UNITED STATES PATENT OFFICE.

HENRY J. GILBERT AND GEORGE A. GILBERT, OF RACINE, WISCONSIN.

ROLLER-MILL.

SPECIFICATION forming part of Letters Patent No. 263,164, dated August 22, 1882.

Application filed February 3, 1882. (No model.)

To all whom it may concern:

Be it known that we, HENRY J. GILBERT and GEO. A. GILBERT, of Racine, in the county of Racine, and in the State of Wisconsin, have invented certain new and useful Improvements in Roller-Mills; and we do hereby declare that the following is a full, clear, and exact description thereof.

Our invention relates to that class of mills in which the grain to be reduced to flour is passed from a suitable hopper between successive sets of adjustable rolls revolving in opposite directions and at different rates of speed. The rolls are placed in pairs at each end of a suitable frame forming a part of the machine, one of the rolls of each set being journaled in permanent bearings and the other roll of each set being placed in bearings arranged to slide back and forth, and provided with suitable mechanism to admit of nice adjustment of the rolls at each end of machine simultaneously while in motion or otherwise. The grain falling through the hopper between the first set of rolls is reduced to a certain extent, the finer portions passing through a reciprocating screen of novel construction, and the coarser particles being carried across by the screen and upwardly to the other end of the machine above, and then falling between the next set of rolls, and so on. From the second set of rolls, in like manner, the particles of the reduced grain fall upon a second screen of similar construction to the first. The finer portions, passing through the wire-gauze of the screen, drop on any suitable device to convey them away, and the coarser being carried to the opposite end of the machine upwardly and above the third set of rolls, between which it is dropped and where it becomes further reduced, and so on until it has reached the desired degree of fineness. We attain these results by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a perspective view taken from one side of the machine. Fig. 2 is a perspective view taken from the other side of the machine. Fig. 3 is a sectional side elevation. Fig. 4 is a detailed view, showing the means for adjusting the boxes or bearings of the slow rollers. Fig. 5 is a detailed view of the rods and levers for adjusting the rollers. Figs. 6 and 7 are detailed views of the yoke and eccentric bolt.

A is the frame of our machine, made preferably of channel cast-iron. It is composed on each side of four uprights, A' A^2 A^3 A^4, connected by a suitable number of longitudinal ribs or bars, A a a' a^2, and a base, a^4, which latter is secured to the floor. The two sides of the frame are bound together by the transverse bolts V V V V. That portion of the upper bars, A, between uprights A' and A^3 is horizontal, or nearly so, and the remainder, from A^3 to A^4, is partly inclined and partly horizontal. The horizontal portion forms a seat for the bearings of the shaft of idler-pulley h^6.

Q is a hopper.

h and h^6 are the idler-pulleys.

O' are the pulleys on the eccentric-shafts.

O^2 are the eccentrics.

H^2 are the straps and rods from the eccentrics, which give motion to the reciprocating screens G.

F are the slow rollers.

C are the fast rollers.

O are the belts which drive the pulleys O'.

E is the belt which drives the fast rollers C.

E' is the belt which drives the slower rollers F.

G' is a pulley over which the belt E' passes, where it goes through the floor.

g^2 is a belt-tightener.

g is the pulley which drives the first slow roller of the series, (taken in the order in which the grain passes.)

f is the pulley which drives the second slow roller of the series.

e is the pulley which drives the third slow roller of the series.

d is the pulley which drives the fourth slow roller of the series.

c is the pulley which drives the fifth slow roller in the series.

b is the pulley which drives the sixth and last of the series of slow rollers.

I I I I are the springs which support the screens G G G G G G.

2 is the pulley which drives the first of the series of the fast rollers C, (taken in the order in which the grain passes.)

1 is the pulley which drives the second of the fast rollers C.

4 is the pulley which drives the third in the series of fast rollers C.

3 is the pulley which drives the fourth of the series of fast rollers C.

6 is the pulley which drives the fifth of the series of fast rollers C.

5 is the pulley which drives the sixth of the series of fast rollers C.

7 is the pulley which the belt E passes over, where it goes through the floor.

8 is a belt-tightener.

N is a lever on one end of the machine. N^2 is another lever on the other end of the machine. N^3 is an intermediate lever-support between N and N^2.

P is a bar extending from the lever N to lever N^3, thence to lever N^2, and is attached to each by a pivot or a bolt, as shown in Fig. 5. Each two sets of rolls on each side of the machine are provided with levers N N^2 N^3 and connecting-bars P. The levers N^3 are keyed at their lower extremities to shafts p^4, which extend clear across the machine and have similar levers, N^3, keyed at their other extremities.

D is one of the movable bearings for the slow roller F.

H is a screw-shaft.

K is a yoke attached to end of screw-shaft H.

M is an eccentric bolt.

H^3 is a spiral spring.

h^3 is a nut.

h^4 is a sleeve.

H^4 is a hand-wheel.

B is a stationary bearing for the fast roller C.

A a a' a^2 are rails or bars connecting uprights A′ A^2 and A^3 A^4 and forming seats for the bearings B and D of the fast and slow rollers, respectively, as shown in Fig. 5.

W W W are pulleys on the shafts of the fast rollers C, and drive the belts O, which communicate motion to the pulleys O′ on the shafts H′ of the eccentrics O^2.

U^2 U^2 U^2 U^2 are slots in the uprights A^2 and A^3.

U U U U are bolts which secure the lower ends of the springs I. They pass through the slots U^2 U^2 U^2 U^2, and thus permit the adjustment of the screens G to the inclination which may be required.

To the ribs a a' a^2 and between the uprights A^4 and A^3 we secure three sets of bearings, B, of the fast rollers C, and between these bearings and the posts A^4 we secure the adjustable bearings D of the slow rollers F. The adjustment is made by the screw-shafts H, which pass through the uprights A^4 at one end of the machine and through the uprights A′ at the other end, and the other three sets of bearings of the fast and slow rollers F and C respectively are secured to the ribs a a' a^2 between the uprights A^2 and A′. The fast-running rollers C are provided with pulleys 1 2 3 4 5 6 on a line with their driving-pulley, (placed in the present instance below the floor,) and are provided with three pulleys, W W W, on the other ends of the shafts, upon which they turn. These pulleys W are provided with belts O, which drive the pulleys O′ on the eccentric-shafts H′, and thus operate to give a reciprocating motion to the sieves G through their connecting eccentric straps and rods H^2, and the velocity of their shake is made to conform to the speed of the rollers C. Both the fast and slow rollers may be driven by the same shaft by pulleys of different size secured to said driving-shaft, which in the present instance is below the floor and out of sight. The driving-pulleys on the fast rollers C are all arranged on one side of the machine in such manner that the whole of them may be driven by a single belt, E. In like manner the driving-pulleys of the slow rollers F are all upon the opposite side of the machine, and are so arranged that the whole of them may be driven by single belt E′.

We will designate the pulleys on the fast-running rollers by numbers 1, 2, 3, 4, 5, and 6, respectively, and those of the slow-running rollers by letters b c d e f g, respectively.

As the belt E passes up from its pulley on the driving-shaft below it is first passed over an idler, h^6, above upright A^4, and down, over, and under pulley 1, thence up, over, and under pulley 2, thence down, over, and under pulley 3, up, over, and under pulley 4, down, over, and under pulley 5, and up, over, and under pulley 6, and thence down over an idler, 7, (having a tightener, 8,) and down to the driving-pulley, as shown in Fig. 1.

Our slow rollers are driven by a belt, E′, that comes up from its driving-pulley on the described driving-shaft (not shown) and passes over an idler, G′, having a tightener, g^2, thence under and over pulley c, under and over pulley d, under and over pulley e, under and over pulley f, and under and over pulley g, and thence over idler h, above upright A′, and down to its shaft again, all as shown in Fig. 2. Now, while the rollers C are revolved rapidly in one direction the rollers F are slowly revolved in an opposite direction, and at the same time the sieves G are agitated.

The sieves G are supported from the under side by flat springs I, which are secured by bolts inserted in slots in the uprights A^2 and A^3, so as to allow of adjustment up and down. The upper ends of the springs are bent around bolts which extend from the sieves, so that when the sieves are reciprocated by the eccentrics they will be thrown up by the springs I as they are moved in one direction and down again as they move in the opposite direction, and thus their motion will be forward, and up, and backward, and down.

As we intend to make the sieve the subject of another application for Letters Patent, we

shall not in this place enter into a detailed description of it. Its action, however, is such that it permits the fine portions of the broken grain (flour and middlings) to pass through it, while the coarser particles gradually ascend the incline until they fall over the upper end and drop down between the rolls, to be further acted upon.

D are the adjustable bearing-boxes for our slow rolls F. They are provided with boxes which are tongued so as to project through suitable openings in their supporting-rails. Screw-bolts pass through said openings or slots and hold the boxes down on the rails, as shown in Fig. 4. Each box D is cast with an opening in one side to receive the yoke K. The yoke K fits over the eccentric bolt M, and said bolt M has bearings m' m^2 on each side of the eccentric, and also a square shoulder, m^3, and is operated by a lever, N, which is firmly fitted and fastened on the shoulder m^3, so that when the lever is thrown in one direction it will carry the eccentric bolt M against the end of the yoke and in the other direction against the end of the rod H, and thus draw the box D either from or toward the box of the fast roller.

The function of the screw-shaft H is to bear against the box D, and thereby insure contact between the rollers C and F; and this shaft is operated by the hand-wheel H^4, and has on its outer end hand-nuts h^2 h^2, to secure the hand-wheel against accidental displacement after it has been set to place.

H^3 is a spring on the inner end of the shaft H, which bears against the box D at one end and against a nut, h^3, which fits over a screw-threaded sleeve, h^4, projecting from the upright A' or A^4. By turning this nut toward the box D the tension of the spring H^3 is increased.

It will thus be seen that the boxes D and B may be separated by the levers N N^2 N^3 and rods P, and be again brought toward each other by means of the said levers and rods, and held in place by means of the screw-shafts H, hand-wheels and hand-nuts H^4 and h^2 h^2, aided by the force of the springs H^3, which latter will, however, yield and permit the boxes and their rollers to separate should any hard substance or foreign matter come between the rollers, thereby preventing injury to the latter or to the bearings and appliances thereof.

There are two rods, P, to each double set of rollers, one on each side of the machine. Consequently a machine having six sets of rollers will have six rods, P, three of them on each side of the machine. The ends of the rods P are fastened by bolts or pivots to levers N and N^2, and also secured by pivot or bolt to lever N^3. The lower ends of levers N^3 are keyed to the shafts p^4, which have bearings in the rails or ribs a a' a^2 and extend across the machine, so that any movement to either of the levers N or N^2 will be communicated simultaneously to all in that particular set or series and to its connections on both sides of the machine. Thus the operator has only to pull one of the levers N or N^2 in order to instantly free both sets of fast and slow rollers in that series from contact with each other, while a reverse motion of the lever N or N^2 will at once bring the fast and slow rolls of both sets of rollers again into contact. The rock-shafts p^4 have for their objects the communication of the motion from one side of the machine to the other when either of the levers N or N^2 is moved, and in this manner move either of the rollers F simultaneously from or toward the rollers C′ evenly and equally throughout their entire length, no matter which lever is moved.

We claim—

1. In a roller-mill, the fast rollers C, provided with driving-pulleys 1 2 3 4, &c., at their ends, at one side of the machine, and the pulleys W at their opposite ends, the slow rollers F, having driving-pulleys b c d e, &c., the shafts H′, provided with the eccentrics and pulleys O′, and idlers h and h^6, in combination with belts E, E′, and O, arranged upon the pulleys of the rollers C and F and shafts H′, respectively, as set forth.

2. The combination, in a roller-mill, of the fast rollers C, provided with pulleys W, belts O, shafts H′, provided with the eccentrics O^2 and pulleys O′, connecting-rods H^2, sieves G, and adjustable springs I, substantially as described.

3. In combination, rolls C F, sliding boxes D, the yokes K, eccentric bolts M, levers N N^2 N^3, transverse shafts p^4, and connecting-rods P, as shown and described, and for the purposes set forth.

4. In combination with the upright and supporting rails of a roller-mill, the sliding adjustable boxes D, having openings on their sides, yokes K, the screw-shafts H, sleeves h^4, nuts h^3, springs H^3, hand-wheels H^4, hand-nuts h^2 h^2, levers N N^2 N^3, rods P, and transverse shafts p^4, as described, and for the purposes set forth.

In testimony that we claim the foregoing we have hereunto set our hands this 25th day of January, 1882.

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GEO. A. GILBERT.

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