(No Model.) 2 Sheets—Sheet 1.

G. S. CRANSON.

MACHINE FOR HULLING AND GRANULATING GRAIN.

No. 283,212. Patented Aug. 14, 1883.

Fig. 1.

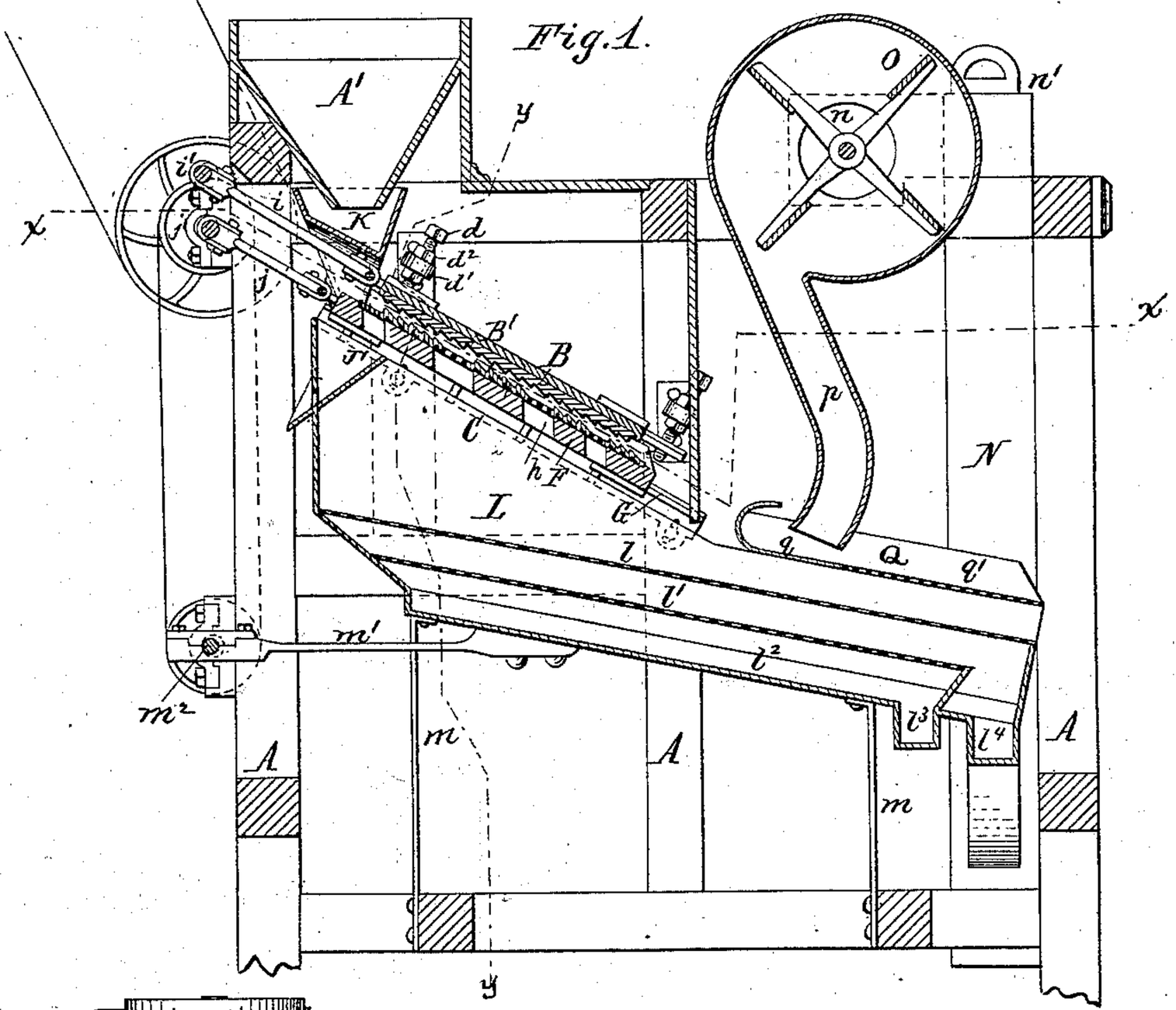
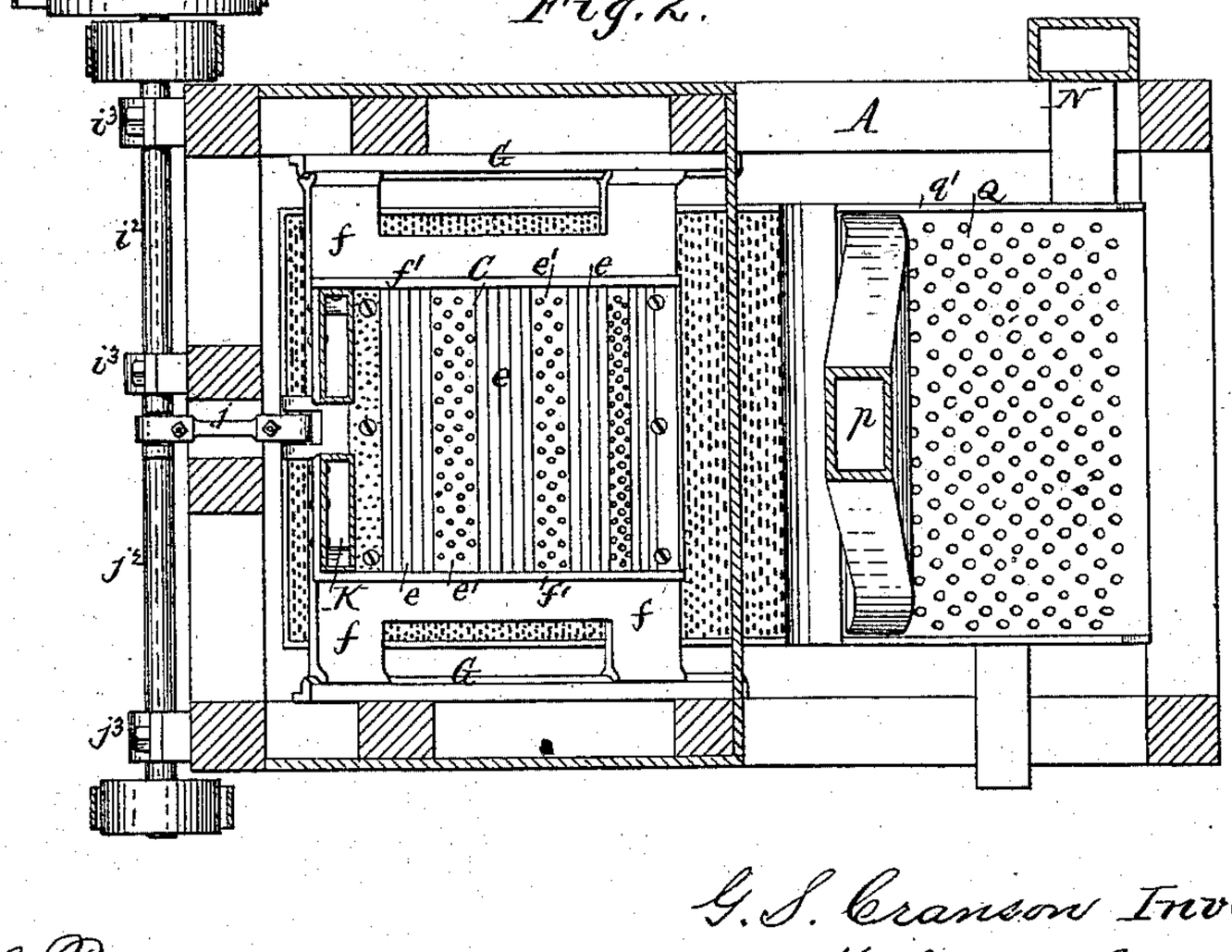


Fig. 2.



Witnesses:
Theo. L. Popp.
Edw. J. Brady

G. S. Cranson Inventor.
By Wilhelm & Bonner.
Attorneys

(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

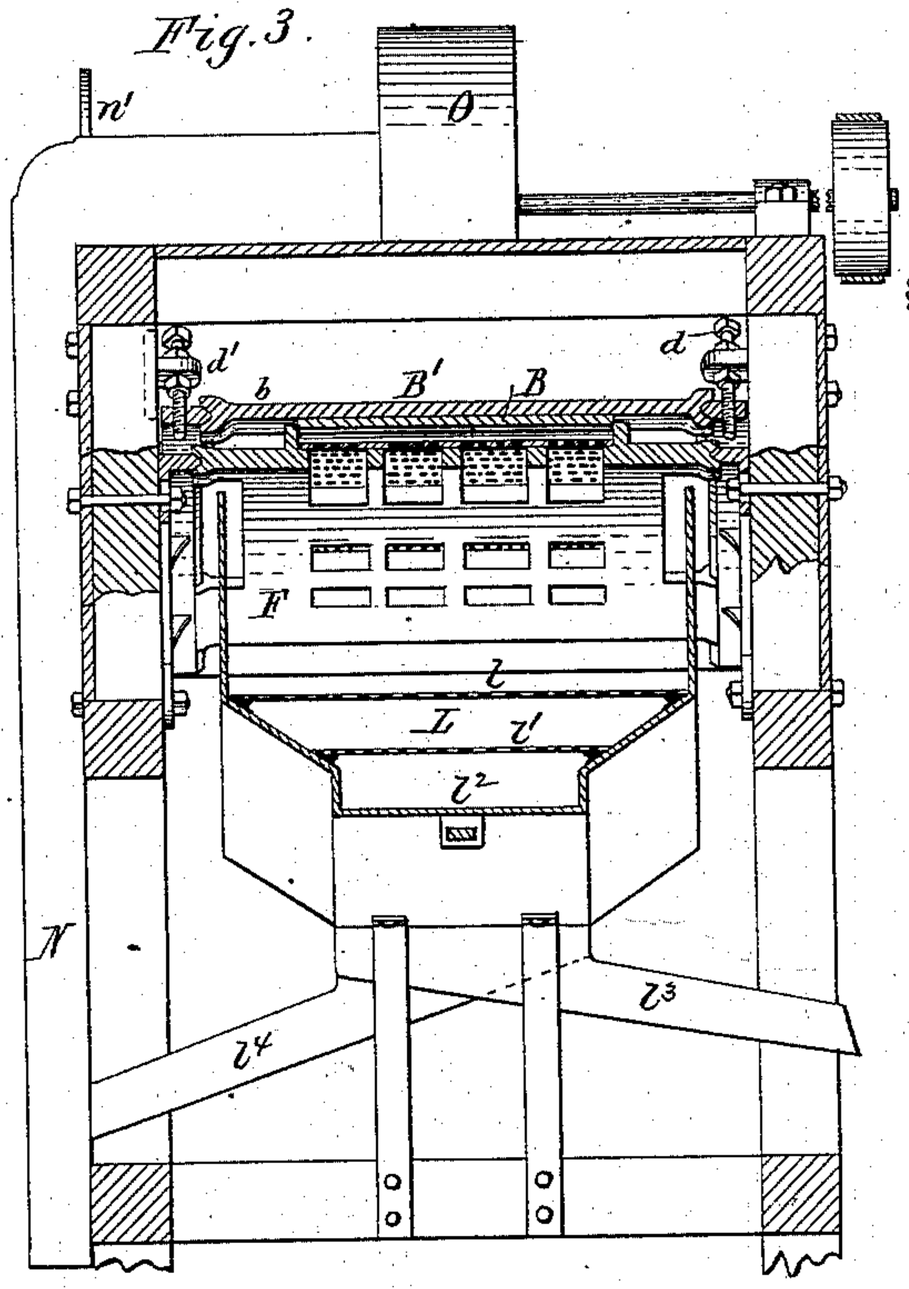


Fig. 4.

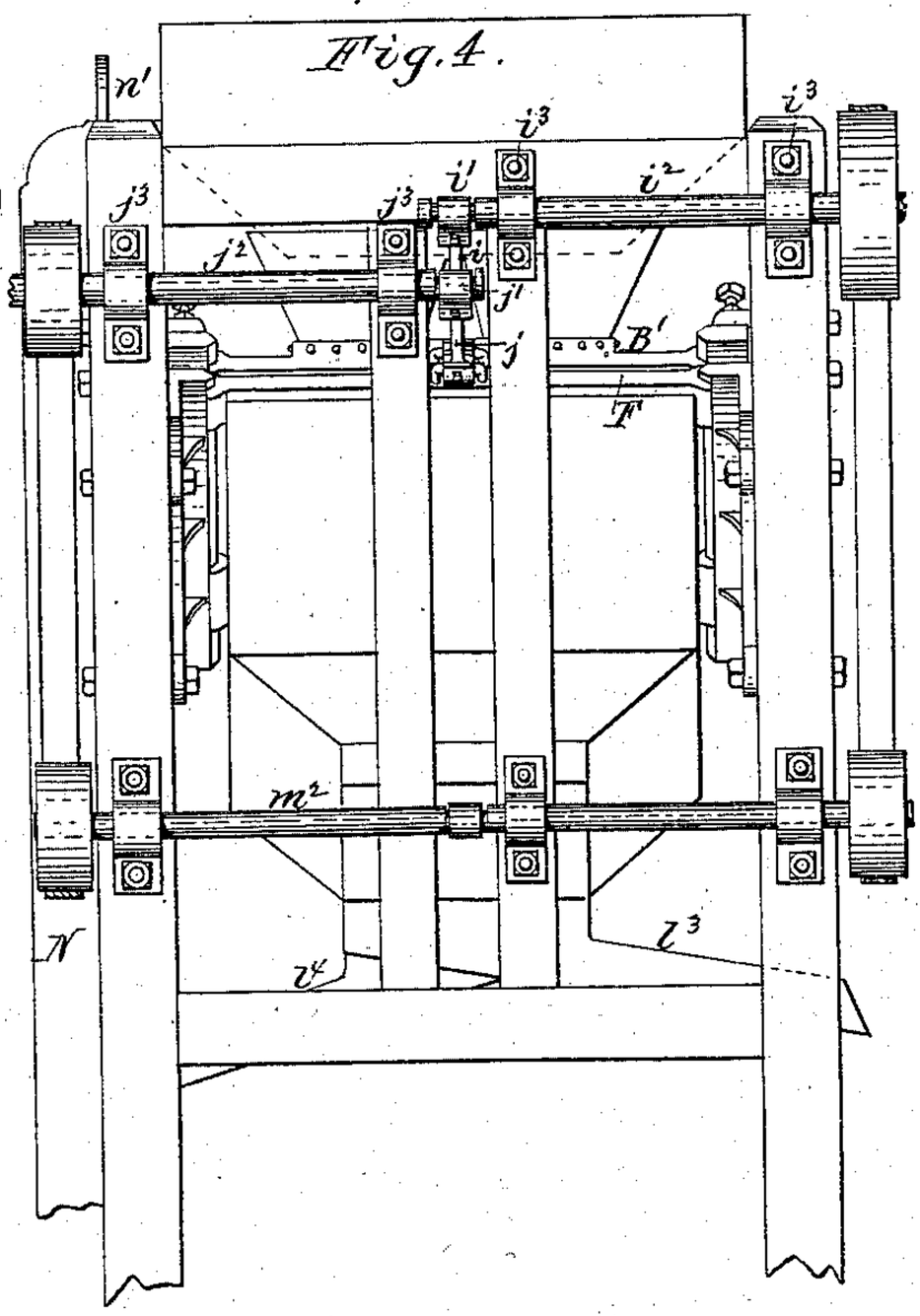


Fig. 5.

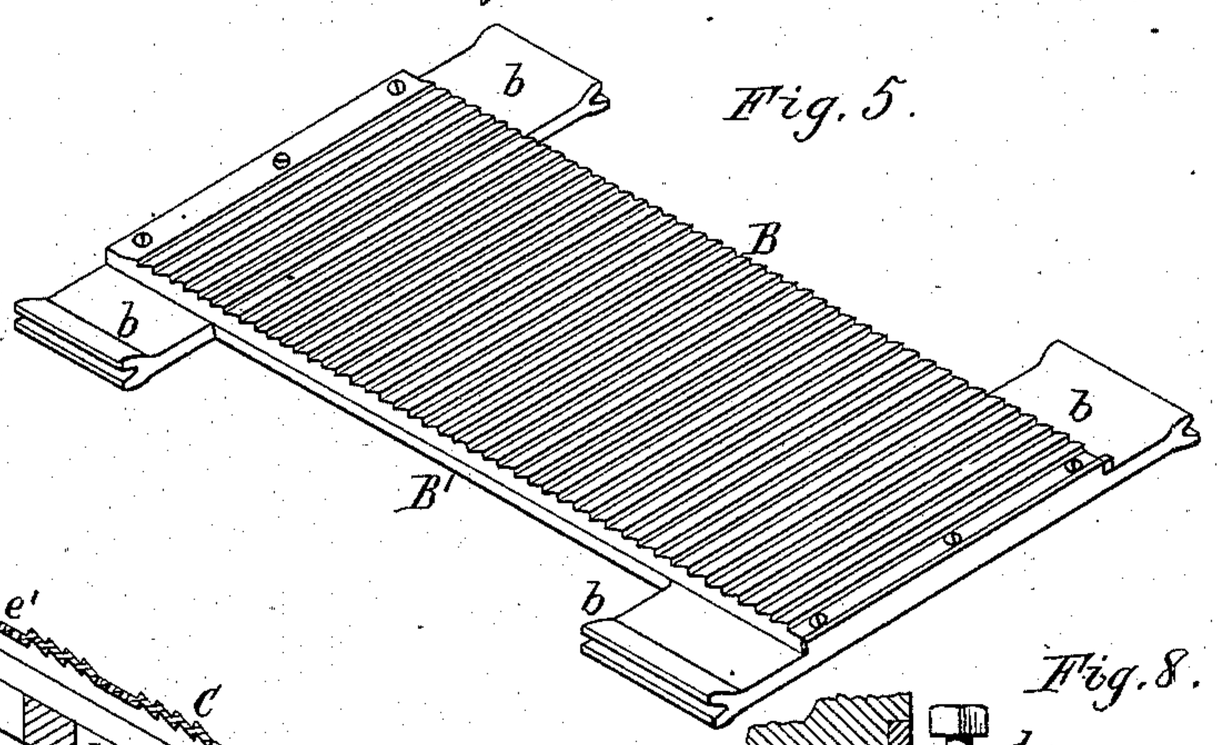


Fig. 6.

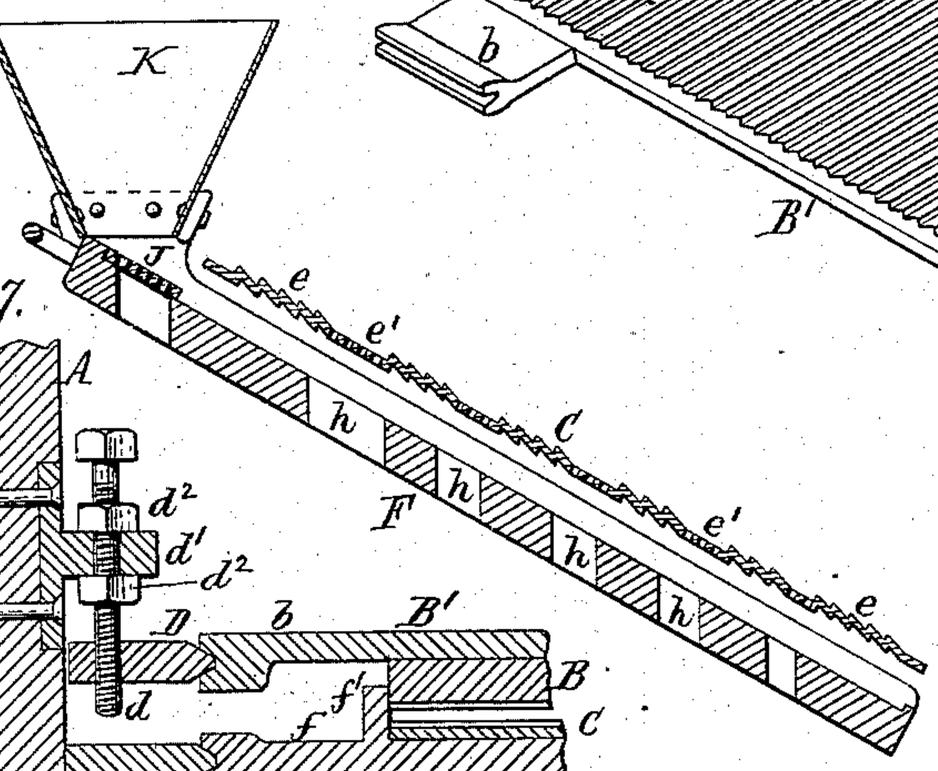
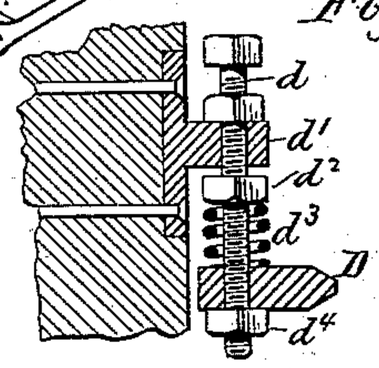


Fig. 7.

Fig. 8.



Theo. L. Popp.
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G. S. Cranson Inventor.
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Attorneys.

UNITED STATES PATENT OFFICE.

GILES S. CRANSON, OF SILVER CREEK, NEW YORK.

MACHINE FOR HULLING AND GRANULATING GRAIN.

SPECIFICATION forming part of Letters Patent No. 283,212, dated August 14, 1883.

Application filed March 31, 1883. (No model.)

To all whom it may concern:

Be it known that I, GILES S. CRANSON, of Silver Creek, in the county of Chautauqua and State of New York, have invented new and useful Improvements in Machines for Hulling and Granulating Grain, of which the following is a specification.

The first part of this invention relates to an improvement in that class of machines in which the grain is hulled between two corrugated or grooved plates, one or both of which have a reciprocating movement, the plates being more or less inclined to cause the grain to pass through the space between the corrugated faces of the plates. In machines of this class the comminution is liable to be carried too far, so that the shucks, hulls, or bran are cut or reduced too finely, thereby causing the production of fine specks, which become commingled with the finely-reduced particles of the flour-producing portions of the grain, from which it is very difficult to separate the specks afterward by bolting or purifying.

The object of the first part of my invention is to obviate this difficulty and to construct the hulling and granulating mechanism in such manner that the fragments of the flour-producing portions of the kernels which have been reduced to the proper degree of fineness are discharged from the hulling or reducing mechanism, and thereby prevented from being too finely reduced, while the coarse particles are further reduced.

The second part of my invention relates to an improvement whereby the valuable particles of the product which are accidentally carried away by the separating air-current, together with the fragments of bran, shucks, or hulls, are recovered from said air-current and separated from the accompanying offal.

My invention consists to these ends of the improvements which will be hereinafter fully described, and pointed out in the claims.

In the accompanying drawings, consisting of two sheets, Figure 1 is a longitudinal sectional elevation of a machine provided with my improvements. Fig. 2 is a horizontal section in line *x x* of Fig. 1. Fig. 3 is a vertical section in line *y y*, Fig. 1. Fig. 4 is an elevation of the front end of the machine. Fig. 5 is a perspective view of the upper corrugated plate inverted. Fig. 6 is a longitudinal section of the lower corrugated plate and its supporting-frame, the two parts being slightly separated. Fig. 7 is a cross-section of the plates and supporting parts on an enlarged scale. Fig. 8 is a similar view, showing a modified construction of the mechanism whereby the upper plate is supported and adjusted.

Like letters of reference refer to like parts in the several figures.

A represents the stationary frame of the machine, and A′ the feed-hopper supported on the same.

B and C represent, respectively, the upper and lower corrugated plates, between which the grain is hulled and granulated.

The plate B may be constructed of steel, chilled cast-iron, glass, or other suitable material, and is preferably made detachable from its supporting frame or plate B′, so that it can be reversed end for end on the same, when desired. The supporting plate or frame B′ is provided with laterally-extending shoes *b*, which are provided with V-shaped grooves, by means of which they slide on rails D D. The latter are secured in an inclined position to the inner sides of the frame A, and made adjustable on the same by adjusting-screws *d*, which work in threaded openings in the rails D and pass through lugs *d′*, secured to the frame A. The screws *d* are secured in the desired position by jam-nuts d^2.

In Fig. 8, d^3 represents a spiral or other suitable spring, which is interposed between the lower jam-nut, d^2, and the rail D, and which permits the latter to yield when a stone or other hard substance of unusual size passes between the plates. When the spring d^3 is used, the lower end of the adjusting-screw passes loosely through the rail, and the latter is supported by a screw-nut, d^4.

The lower plate, C, is composed of alternate strips of corrugated metal *e* and perforated metal *e′*. The alternate strips *e* and *e′* may be constructed of one piece, preferably chilled steel, or they may be constructed in separate pieces and secured separately to the supporting-frame F, so that each strip can be removed or reversed when required. The supporting-frame F of the lower plate is provided with laterally-extending shoes or guides *f*, construct-

ed like the shoes *b* of the upper plate, and running on rails G, arranged below the rails D, and secured to the frame A by bolts *g*, passing through elongated holes *g'*, formed in lugs or flanges on said rails. The supporting-frame F of the lower plate is provided on its upper side with raised longitudinal ribs or flanges *f'*, which fit snugly against both sides of the corrugated plate B and prevent the escape of the material from between the plates in a lateral direction.

h represents openings formed in the supporting-plate F, underneath the perforated portions *e'* of the plate C, for the escape of the fine material which passes through the perforations.

i represents a connecting-rod, which extends from the upper end of the plate B or its supporting-plate B' to an eccentric or crank, *i'*, formed on or secured to the inner end of a horizontal shaft, i^2, which is mounted in bearings i^3, and whereby a reciprocating motion is imparted to the plate B. The lower plate, C, receives a similar motion by means of a connecting-rod, *j*, an eccentric or crank, *j'*, and a shaft, j^2, mounted in bearings j^3. The upper plate, B, is preferably reciprocated with less speed than the lower plate, C, so as to produce a differential motion between the ribs of the plates; or the upper plate may be made stationary, if desired.

J represents a perforated plate, arranged at the head of the lower plate, C, for separating the fine dust from the grain before it enters between the reducing-surfaces; and J' is a hopper whereby the separated dust is discharged, and which may be secured to the plate C or any other suitable part of the machine.

K represents a feed-hopper, which is secured to the upper end of the frame F of the lower plate, so as to receive the material from the hopper A' and deliver the same between the corrugated surfaces of the plates. The hopper K is divided centrally in its lower portion, so as to straddle the connecting-rod *i* of the upper plate and permit the free movement of the latter through the hopper.

L represents a shaking-shoe arranged underneath the plates B and C, and provided with separating sieves or screens *l l'*, whereby the material is separated according to fineness. The finest material—such as flour—passes through both sieves *l l'* and falls on the inclined bottom l^2 of the shoe, from which it escapes by a spout, l^3. The coarser material—such as fragments of the meats or flour-producing inner portions of the kernels—passes through the upper screen, *l*, but not through the lower screen, *l'*, and escapes over the tail end of the screen *l'* into a spout, l^4, and the coarsest material—such as hulls, shucks, or bran—escapes over the tail end of the screen *l*. The shoe L is supported upon spring-arms *m*, and receives a vibratory motion by a connecting-rod, *m'*, which is operated by an eccentric or crank shaft, m^2.

N represents an ascending air-spout, which receives the material from the spout l^4, and connects at its upper end with the eye *n* of a fan, O, the spout N being provided with a slide, *n'*, in a well-known manner, to regulate the force and volume of the air-current.

p represents the discharge or blast spout of the fan, which extends downwardly from the fan-case, and terminates at a short distance above an auxiliary screen, Q, which is secured to the rear portion of the shoe L above the screen *l*. The blast-spout *p* gradually enlarges laterally toward its lower end, whereby the force of the blast is correspondingly reduced.

q represents a tight plate, which is arranged directly underneath the blast-spout at the head of the screen Q, and which receives the impact of the blast and of the material which is discharged with the blast. The upper end of the plate *q* is turned over or curved backwardly to confine the blast and direct it toward the tail end of the screen Q, and the latter is provided with raised side pieces, *q'*, which also confine the blast and prevent any of the material from being blown over the sides of the screen.

The large fragments of meats which pass into the spout l^4 are accompanied by fragments of the hulls or shucks of the grain. This material falls from the spout l^4 into the air-trunk N, in which it meets the ascending air-current, which carries off the lighter parts of the material—such as the fragments of hulls and bran—while the heavy particles, consisting of fragments of meats, fall through the air-current and escape at the lower end of the air-trunk. The air-current carries off with the fragments of hulls or bran a certain quantity of finer fragments of meats, and these fragments are further reduced by the beating action of the fan-blades, while the tougher fragments of bran are not affected thereby. The blast escaping from the fan delivers this material upon the tight plate *q*, from which it passes to the sieve Q. The latter effects a separation of the fine portions of the flour-producing particles from the bran and the hulls, the fine particles passing successively through the sieves *l l'*, while the hulls and bran escape over the tail end of the sieve Q. In this manner all of the valuable portions of the material, which would otherwise be carried off by the air-blast with the offal, are separated from the offal and added to the flour-producing portion of the product.

The ribs or corrugations of the plates B and C should be constructed with reference to the particular kind of work for which they are intended. If it is desired to produce a cutting action, the ribs or corrugations should be angular and arranged to work with their abrupt sides toward each other; and if it is desired to produce a non-cutting action, this is readily accomplished by reversing one of the plates on its supporting-frame, so as to cause the ribs to work with their inclined sides toward each other, or by employing round ribs

or corrugations. When the corrugated portions *e* of the lower plate are made separate from the perforated portions *e'* thereof, the corrugated portions may be constructed of the same material as that of which the upper plate is constructed. The corrugations in both plates may extend straight across the plates, as indicated in the drawings; but they may be arranged diagonally, or more or less inclined, if preferred.

The grain which is fed between the plates B and C works toward the lower end of the plates by gravity, and is by the action of the plates broken up in such a manner as to sever the outer tough coverings or hulls from the inner starchy or flour-producing portions of the kernels. As the starchy portions of the grain are more friable than the tough outer coverings, the inner portions are more quickly broken up, and as soon as they have been reduced to the proper degree of fineness they escape through the perforations of the lower plate, and are no longer subjected to the reducing action of the plates. These portions of the grain are therefore prevented from being pulverized too finely, and as a considerable portion of the material escapes through the perforated sections *e'* before it reaches the ends of the plates, the latter are relieved from a great deal of unnecessary work. The material passing through the perforated sections falls upon the upper portion of the screen *l*, and is immediately separated according to fineness, the flour and fine particles passing through the screens *l l'*, while the coarse particles or meats pass over the tail of the screen *l'*. The material escaping over the lower ends of the plates B and C falls upon the lower portion of the screen *l*, and is separated in a similar manner, the shucks, hulls, or bran escaping over the tail end of the sieve, as before stated.

My improved machine is especially adapted for hulling and granulating buckwheat; but it may also be employed for treating wheat and other grains.

The size and form of the perforations in the sections *e'* of the lower plate are regulated according to the particular kind of separation which it is desired to effect, and these sections may be constructed of wire-gauze or bolting-cloth, if required.

I claim as my invention—

1. In a hulling or granulating machine, the combination, with a plate, B, having transverse grinding ribs, grooves, or corrugations, of a plate, C, provided with transverse ribbed, grooved, or corrugated grinding-sections *e* and intermediate transverse perforated sections, *e'*, and mechanism whereby a reciprocating movement is imparted to the grinding-surfaces, substantially as set forth.

2. In a hulling or granulating machine, the combination of two reciprocating plates secured removably to supporting arms or plates, and adapted to be reversed on the same end for end, to change the character of the action of the plates, substantially as set forth.

3. The combination, with a fan, O, a suction-spout, N, adapted to receive the material to be separated, and a blast-spout, *p*, of a plate, *q*, arranged opposite the mouth of the discharge-spout, and adapted to collect the material which is suspended in the air-current propelled by the fan, substantially as set forth.

4. The combination, with a fan, O, a suction-spout, N, and blast-spout *p*, of a plate, *q*, and screen Q, whereby the material contained in the air-current delivered by the fan is collected and separated, substantially as set forth.

5. The combination, with a shaking-shoe, L, having a discharge-spout, *l'*, and a plate, *q*, and screen Q, of a suction-spout, N, fan O, and blast-spout *p*, terminating opposite the plate *q*, substantially as set forth.

6. The combination, with the fan O, suction-spout N, and blast-spout *p*, of the plate *q* and screen Q, provided with raised head and side pieces, substantially as set forth.

7. The combination, with the lower plate, C, of a perforated plate, J, arranged at the head of the plate, to discharge the dust before the grain enters between the reducing-plates, substantially as set forth.

8. The combination, with the blast-spout of a fan, of a collecting plate or pan placed opposite the end of the discharge-spout, and having a raised edge, whereby the heavy material suspended in the air-current is collected, substantially as set forth.

G. S. CRANSON.

Witnesses:
JNO. J. BONNER,
CHAS. F. GEYER.