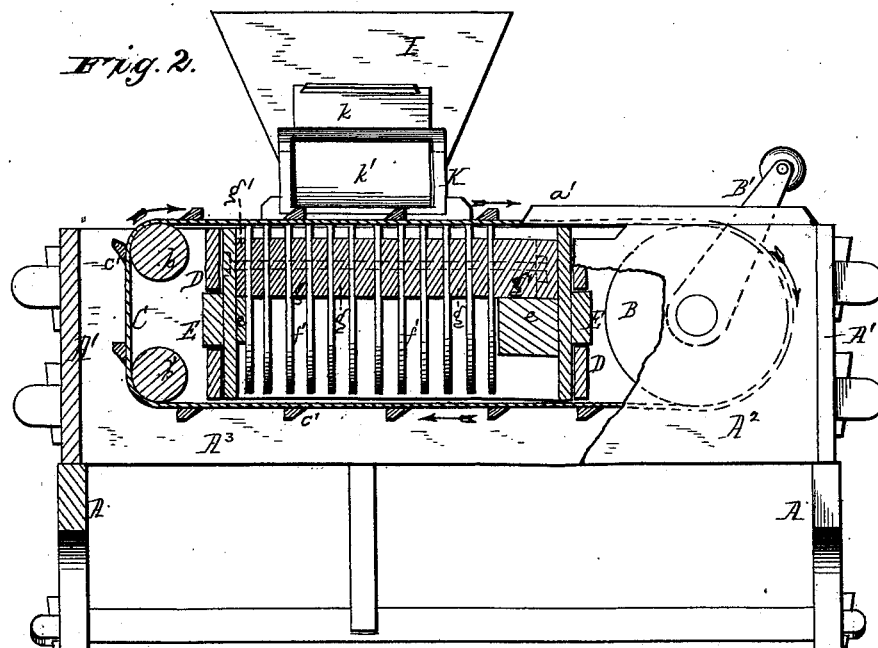
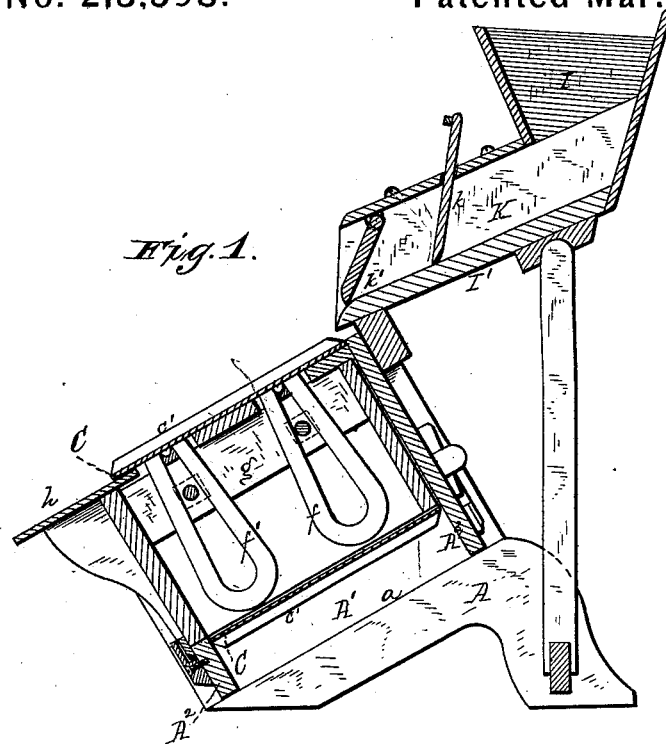


C. WHEELER, Jr.  
Machine for Separating Magnetic Substances from Grain  
No. 213,598.      Patented Mar. 25, 1879.



WITNESSES  
F. L. Curran  
Alexander Mahon

By

INVENTOR  
Cyrenus Wheeler Jr.  
A. M. Smith  
ATTORNEY

# UNITED STATES PATENT OFFICE.

CYRENUS WHEELER, JR., OF AUBURN, NEW YORK.

## IMPROVEMENT IN MACHINES FOR SEPARATING MAGNETIC SUBSTANCES FROM GRAIN.

Specification forming part of Letters Patent No. **213,598**, dated March 25, 1879; application filed February 14, 1879.

*To all whom it may concern:*

Be it known that I, CYRENUS WHEELER, Jr., of Auburn, county of Cayuga, State of New York, have invented certain new and useful Improvements in Machines for Separating Magnetic from Non-Magnetic Substances, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 represents a vertical transverse section through the machine or apparatus; and Fig. 2 represents a vertical longitudinal section through the same, partly in elevation.

Similar letters of reference denote corresponding parts in both figures.

In the process of thrashing grain, &c., the straw of which has been bound with wire, and from various other causes, pieces of wire and metal in other forms frequently become mingled with the grain, and, owing to their superior gravity, the ordinary processes of cleaning the grain fail to effect their separation therefrom, and it becomes a source of annoyance to millers, causing injury and sometimes the destruction of the bolting-surfaces, &c., over which it passes in being converted into flour.

The object of my invention is to remedy this and other difficulties incident to its presence in the grain by effecting its thorough separation and removal therefrom.

The invention consists in a novel arrangement of magnets in connection with a traveling apron or surface, over which the grain is passed in such manner that while the grain moves quickly across or transversely to the path of the apron or moving surface, the metallic substances therein will be caused to adhere to and to move with the apron until carried beyond the action of the magnets, when they will be deposited by themselves.

It further consists in certain details of construction and arrangement of parts, herein-after fully described.

In the accompanying drawings, A represents a base plate or frame, of any suitable construction, (shown, in the present instance, as having an inclined upper face, *a*), upon which end and front and rear uprights or boards *A*<sup>1</sup> *A*<sup>2</sup> *A*<sup>3</sup> are secured, made, by preference, in the form of a rectangular box, and

having an inclined position, due to its being secured to the inclined upper faces of the base plate or frame A. The front and rear plates or timbers, *A*<sup>2</sup> *A*<sup>3</sup>, are provided, near their ends, with bearings for transverse rollers *B b b'*, which carry an endless belt or apron, C, and to which motion is imparted either by hand or from any convenient power, through a crank, *B'*, or through a band or gear wheel applied to the projecting shaft of one of the rollers B. The rollers and the apron assume the inclined position of the frame described, and the rollers are either made of sufficient diameter; or, where preferred, two are employed at one end, one arranged over the other, as at *b b'*, to afford space between the upper and lower inner surfaces or sides of the apron, to cause the latter to pass entirely around a series of magnets, hereinafter explained.

D D are timbers or bars, extending across the rectangular frame *A*<sup>1</sup> *A*<sup>2</sup> within the apron, and slotted longitudinally or provided with cleats for the support of a drawer, E, made in rectangular form, and adapted to be inserted and withdrawn through an opening in the front *A*<sup>2</sup> of the inclined upright frame. Within the drawer E, which is open at top and bottom, except as inclosed by the endless apron, is a series of magnets, *f f'*, made, by preference, in horseshoe form; but they may be of any other kind or form, and arranged in two rows or gangs, one near the upper edge of the inclined upper side of the apron, and the other near the lower edge of the same side, as shown. These magnets are separated from each other by wooden blocks or strips *g*, and are united in gangs by bolts passing through the several strips, the outer strips, *g'*, resting upon cleats or block *e*, secured to the side boards or bars of the drawer E, as shown, this arrangement serving to hold the magnets suspended within the drawer, with the ends of the arms of the magnets in contact, or in close proximity, with the upper portion of the traveling apron, as shown. The apron, which is provided with cleats *e'*, moves in the direction indicated by the arrow, Fig. 2, and at the point at or near where it leaves the gangs of magnets the lower or front board of the upright frame is provided with a ledge, *a'*, rising

above the surface of the upper part of the apron at its lower edge, for a purpose which will be explained. The lower edge of the apron overlaps an inclined chute-board, *h*, over which the grain escapes from the apron C.

I is a hopper for the reception of the grain or seed to be cleaned, terminating in an inclined chute, K, the bottom board, I', of which overhangs the upper edge of the inclined apron C, insuring the discharge of the grain from the hopper upon the moving upper surface of the apron.

The chute K is provided with an adjustable slide, *k*, regulating or stopping the flow or discharge of grain from the hopper, and *k'* is a flap-valve pivoted to and pendent from the upper side or wall of and at the discharge end of the chute K, for directing the grain escaping from the hopper I downward upon the moving surface of the apron C.

The operation is as follows, viz: The grain or other material to be operated upon is fed through the hopper I, and passes therefrom through the chute K, its flow being regulated by the gate *k* and flap-valve *k'*, which causes it to be spread evenly in a thin stream upon the inclined upper surface of the apron C. The apron moves, as will be seen, at about right angles to the stream of grain or other material to be operated upon, and has its surface inclined sufficiently to cause said material, so far as it is not acted upon by the magnets, to continue its path across the apron in a path at, or nearly at, right angles to the path of the apron, causing it to be discharged upon the chute-board *h*, over which it escapes to the ground or into suitable receptacles therefor. The magnetic substances contained in the grain or other material operated upon as they drop from the hopper or chute upon the apron, owing to the action of the magnets, will be caught and held firmly upon the moving surface of the apron, and the transverse cleats *c'* insure their being carried across the series of magnets from one to another until they have passed beyond them and beyond the stream of grain or other non-magnetic material, when they will also slide down to the lower edge of the inclined upper surface of the apron, where they will be caught by the ledge *a'*, and being held thereby within the action of the apron they will still be carried forward until discharged at the end thereof in a heap, or in a receptacle by themselves.

By arranging the magnets within the path described by the endless apron in a removable frame or drawer, as described, their removal and adjustment or renewal is facilitated, as also the application to them of armatures or keepers when the machine is not in operation, such application serving to preserve their magnetic power for a much longer time than where the keepers are not used.

The apparatus described is adapted to be applied to and used in connection with any usual separator of a thrashing-machine, as supplemental thereto, within a flouring or grinding mill, in the process of delivering the grain thereto, or in any of the intermediate processes of cleaning or handling the grain.

I have described it with especial reference to cleaning grain where it has been found in practice to be exceedingly efficient in effecting the separation of broken pieces of wire band, nails, and other fragments of metal from the grain; but it will be apparent that it may be applied with equal advantage to other material to be operated upon in a granulated, pulverized, or otherwise minutely-divided condition, where it is desired to separate magnetic from non-magnetic substances.

It will be evident that the form of the hopper, chute, and other parts of the machine or apparatus may be varied without departing from my invention, so long as the feature of causing the grain or other non-magnetic substances operated upon to cross a surface moving at right angles, or nearly so, to the path of such non-magnetic substances, and to which moving surface the magnetic substances are caused to adhere by the action of fixed magnets until carried beyond the influence of said magnets, remains, as explained.

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

1. In a machine for separating magnetic from non-magnetic substances, a series of magnets, in combination with an apron or other surface adapted to move over said magnets in a path at right angles, or thereabout, to the path of the material to be operated upon, and from which the magnetic substances are to be removed.

2. The endless apron or equivalent moving surface over which the material operated upon is fed, interposed between the fixed magnets and said material, and moving across the path of the same for removing the magnetic substances, substantially as described.

3. The fixed magnets suspended within the path of the endless apron in a removable frame or drawer, substantially as described.

4. The combination, with the inclined apron moving over the fixed magnets, of the ledge *a'* at one side of the path of the material operated upon for preventing the escape of the magnetic substances after they pass beyond the action of the magnets, as described.

C. WHEELER, JR.

Witnesses:

ALEXANDER MAHON,  
JOHN G. CENTER.