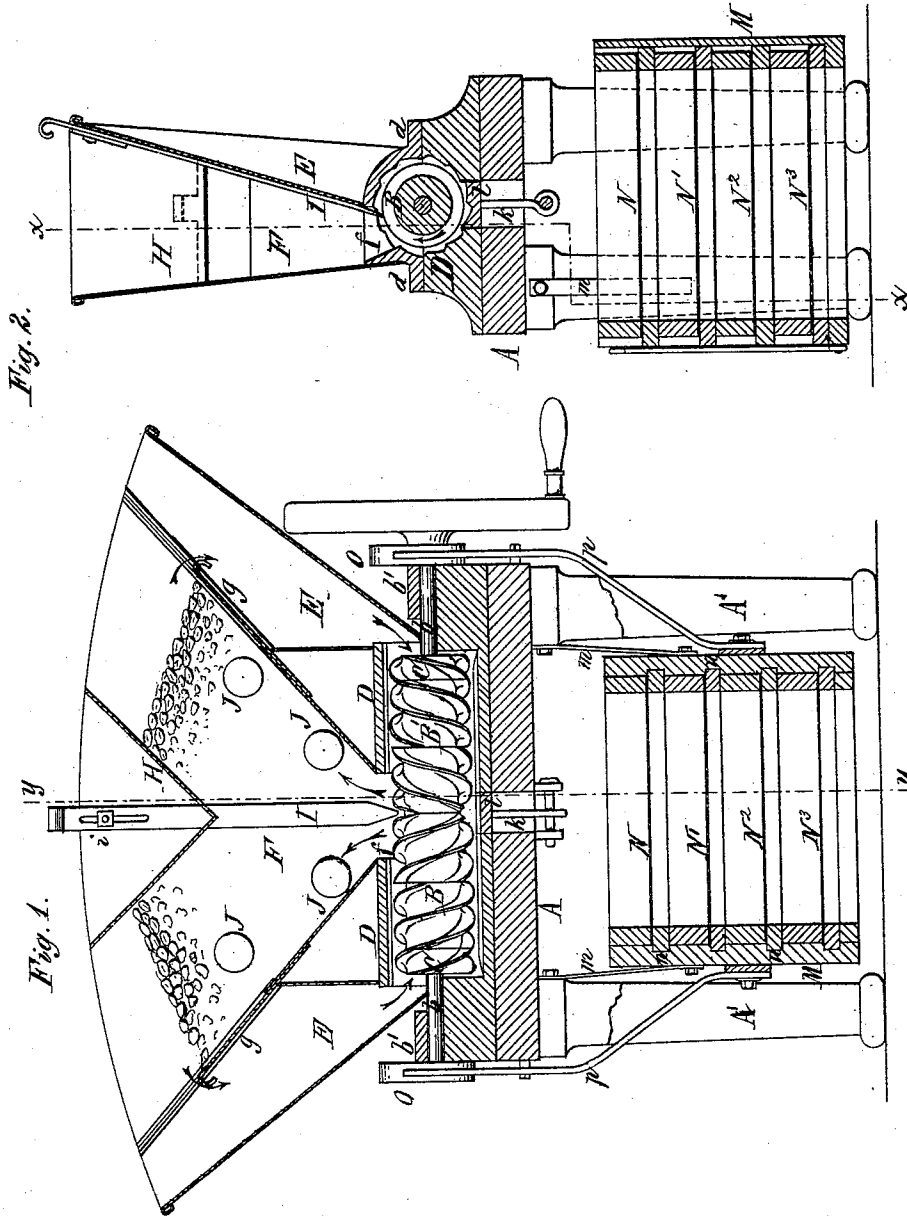


H. B. STEVENS.
COFFEE-CLEANER.

No. 172,671.

Patented Jan. 25, 1876.



Edward Wilhelm
John J. Penner
Witnesses

H. B. Stevens Inventor
by Jay Hyatt Atty.

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Fig. III.

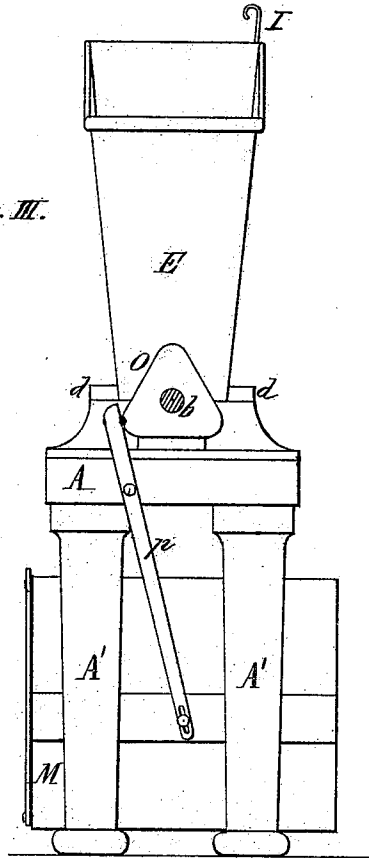
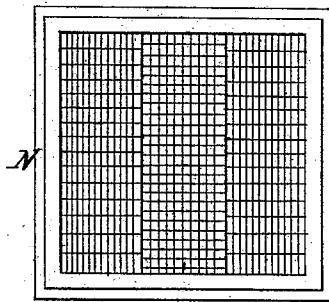


Fig. IV.



Edward Wilhelmus
Jas. J. Bonner. } Witnesses

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UNITED STATES PATENT OFFICE.

HENRY B. STEVENS, OF BUFFALO, NEW YORK, ASSIGNOR TO GEORGE L. SQUIER, OF SAME PLACE.

IMPROVEMENT IN COFFEE-CLEANERS.

Specification forming part of Letters Patent No. **172,671**, dated January 25, 1876; application filed July 1, 1875.

To all whom it may concern:

Be it known that I, HENRY B. STEVENS, of the city of Buffalo, in the county of Erie and State of New York, have invented certain Improvements in Machines for Hulling, Cleaning, and Separating Coffee and similar seeds or grains, which improvements are fully set forth in the following specification, reference being had to the accompanying drawings.

Coffee grows in the form of a berry, consisting of an outer skin and pulp containing usually two kernels, each of which is covered by a thin skin, called the "silver" skin, and enveloped by a husk or shell. In order to fit the coffee for the market, the outer skin and pulp must be broken up, so as to detach the kernels therefrom, and the husk and silver skin removed from the latter, when the dirt, dust, and broken kernels must be separated from the plump or sound kernels. When the berry is dried with the pulp on, the latter becomes more or less tough, forming a coating around the kernels, which is removed with great difficulty. Coffee in this condition is called "double-husk" coffee. Generally the outer skin and pulp are removed while green and soft, thereby freeing the kernels, and forming what is called "single-husk" coffee, when only the husks and silver skin remain to be removed from the kernels in a dry state.

My improved machine is designed to hull, clean, and separate double as well as single husk coffee, the operations being the same in both cases, and differing only in duration.

The nature of my invention will be fully understood from the following description:

In the accompanying drawings, consisting of two sheets, Figure 1 is a vertical section of my improved machine in line *xx* of Fig. 2. Fig. 2 is a vertical section in line *yy*, Fig. 1. Fig. 3 is a side elevation of the machine. Fig. 4 is a plan view of the top riddle.

Like letters of reference designate like parts in each of the figures.

A is the rectangular bed or frame of the machine, supported on legs A'. B B' is the double hulling-screw, consisting of a right-hand and a left-hand screw, joined at the middle, and secured to a horizontal shaft, *b*, turning in bearings *b'*, as shown in Fig. 1. The

screws B B' are each composed of two or more sections, so arranged on the shaft *b* that the threads of one section will coincide with the spaces, or be intermediate of the threads, of the adjacent section, whereby the grains are caused to roll over and change their relative position with reference to each other and to the metallic surfaces in their passage toward the center of the machine. C C represent two propellers or end sections arranged at the feed ends of the screws B B', and having threads of less pitch, so as to offer a greater resistance to the grains than the main portion of the screws, thereby preventing the grains from sliding back under pressure. The screws B B' are arranged in an inclosing cylinder or case, D, preferably composed of a lower part secured to the bed A, and an upper part bolted to the hopper by means of flanges *d*, as shown in Fig. 2. The inner surface of this cylinder is provided with angular corrugations, which cause the grains to roll or turn over as they are moved forward by the screws. The screws B B' are of sufficient diameter to nearly fill the cylinder D, and the shaft *b* is preferably arranged a little below the center of the cylinder, so that the threads of the screws shall sweep close to the bottom of the cylinder to prevent any kernels from lodging there.

E E are two feeding-chambers, the lower ends of which communicate with the ends of the chamber D, and F is an intermediate pressure-chamber of hopper form, and connected with the cylinder D by an opening, *f*, formed at the center of the cylinder or over the point where the right and left screws B B' meet. The size of the opening *f* may be made adjustable, so as to let more or less of the coffee through at once. Between the center compartment F and the two end compartments E I place a sliding partition or gate, *g*, that may be raised or lowered at will, to increase or diminish the height of the partitions.

In order to prevent any portion of the coffee from lodging and remaining in any part of the compartments E F, and to insure a perfect circulation, so that every kernel shall pass on in its order and none escape uncleaned, I construct the compartments E E F in a peculiar form, with all parts of each compartment ta-

pering at an acute angle toward the opening in the cylinder that belongs to that compartment. This matter of perfect circulation I consider of great importance, as, if a portion of the coffee lodges in any part of the machine, it escapes the cleaning process and injures the appearance of the whole batch.

In working the machine, all three compartments of the hopper are filled with the raw or unhulled coffee. The screws are then rotated, and the propellers C C' draw in the coffee from the two end compartments E E of the hopper, and hold it from sliding back under pressure while the screws take it and force it along toward the center of the cylinder, the corrugations of the cylinder and the alternating threads of the screws causing a continual agitation and change of place of the kernels among themselves, the two screws bringing the coffee from each end to the middle, where it crowds against itself, producing a powerful pressure upon all the coffee in the cylinder, whereby each kernel, and every part of each kernel, is subjected to a friction or grinding process against one another, and against the metallic surfaces, breaking and grinding up the husks and rubbing off the silver skin, and giving each kernel the desired polish, until it is finally forced up through the top opening *f* in the center of the cylinder into the central compartment F. The unhulled coffee originally placed in this compartment is lifted up by the hulled kernels, expelled through the opening *f*, and gradually lifted or forced over the partitions into the end compartments E E, and is thus fed to the propellers, to be followed by the coffee that has passed through the cylinder, and thus the circulation is kept up continually until all the coffee is thoroughly cleaned and polished.

By raising or lowering the gates or partitions *g* between the center and end compartments the pressure in the cylinder may be increased or diminished by increasing or diminishing the height of the column of coffee in the center compartment. The machine is thus easily adjusted to the kind and condition of coffee to be cleaned and to the power used.

When a greater pressure is desired than can be given by raising the gates *g* to their highest position it can be attained by placing metal balls or weights J on top of the coffee in the central compartment.

Balls of various sizes and number can be used, so as to get every degree of pressure desired. As the coffee rises in the center compartment its tendency is to accumulate in a heap in the center of the compartment and remain comparatively stationary, while that which rises near the partitions or gates flows over into the end compartments, thus preventing an even and equal circulation of the kernels. To obviate this difficulty, I place a V-shaped deflector, H, across the central compartment, extending for a considerable distance down into the compartment. This deflector effectually prevents the grain from piling up

in the center, divides it equally, and guides it to each end compartment, and thus insures a uniform and equal circulation of the kernels. Sometimes, especially if the coffee is a little green, or has not been thoroughly dried before cleaning, it is liable to pack and clog at the outlet of the cylinder at the bottom of the central compartment. To obviate this I provide an adjustable finger or agitator, I, which can be extended down into the opening *f* to break up any clogging that may occur there. This agitator, being adjustable by a thumb-screw, *i*, can be adjusted to any kind or condition of coffee to be cleaned, and effectually prevents all clogging at this point.

After the coffee has been run in the machine sufficiently long to be thoroughly clear of the husk and silver skin, and polished to the degree desired, it is removed or discharged from the huller through an opening or throat, *k*, formed in the center of the lower half of the cylinder, opposite to the opening *f* in the upper half thereof.

When the machine is at work the discharge-opening *k* is closed by means of a suitable stopper or gate, *l*, held in place by a pin or other suitable device. When it is desired to empty the coffee from the huller, the gate *l* is opened and, by a few revolutions of the screw, the coffee is all brought to the discharge-opening and passed through.

In large machines, designed to be driven by steam or other power, the screws B B' may be made of such length as to thoroughly hull and clean the coffee by passing it once through the cylinder, when the pressure-chamber F and opening *f* are dispensed with and the discharge-opening *k* provided with an adjustable gate, so as to regulate the discharge, in order to produce the required pressure upon the material in the cylinder. Any kernels which may escape unhulled from the machine are separated from the hulled kernels and returned to the feed-hoppers.

The coffee comes from the huller mixed with the husks and silver skin, which have mostly been ground to a fine meal or powder, and it is necessary to separate the coffee from this, as well as to separate the coffee into various grades, to fit it for market. This is accomplished by means of a shaking separator, arranged underneath the huller and constructed in the following manner: M is the rectangular frame or case of the separator, suspended from the legs of the huller by hangers *n* and provided with horizontal ways *n*, in which a series of removable sieves or screens, N N¹ N² N³, are arranged. The ground husks and silver skins fall through the meshes of the whole series of riddles to the ground, leaving the coffee of various grades in the various riddles. The top screen N is intended to take out or retain any unhulled grains that may have passed through the huller through the carelessness of the operator, or from any other cause.

In nearly all lots of coffee the grains are of

two distinct shapes. The majority of the grains are oblong, with one side flat, while a small portion of the grains are nearly spherical and are called "pea-grains."

It is obvious that a square mesh large enough to let the pea-grains pass through would permit but a small portion of the oblong grains to pass through, and if the mesh was made large enough to let all the oblong grains through it would also let through many of the unhulled grains. If an oblong mesh is used it will pass the oblong grains, but will not pass the pea-grains unless the mesh is made wide enough to also let through many of the unhulled grains. I therefore make my first riddle with an oblong mesh that is of the right size to let through the oblong grains without letting the unhulled grain through, and with a square mesh the right size to let the pea-grains through without letting the unhulled grains through. These meshes may be made in alternate rows, or one section of the riddle may be made of one kind of mesh, and the rest of the other kind, as shown in the drawing. With a riddle thus constructed all the hulled coffee will pass through, while the unhulled will be retained in the riddle to be again emptied into the huller. The next screen N^1 is made with a long narrow mesh large enough to let through the small inferior and dead grains, but retaining all the plump and perfect grains, while the screen N^2 has a still narrower long mesh, which lets through all the broken grains and the most inferior portion of that which falls into this riddle. The last screen N^3 has a still narrower long mesh, which retains all the coffee that reaches it, and only lets through the dirt and ground hulls. Other riddles may be added to separate the coffee into still more grades, if desired.

In separating coffee I deem the oblong mesh essential on account of the peculiar shape of the grains, and so far as I am aware it has never before been used in a coffee-separator.

The shaking of the screen-frame M may be done by hand, but I prefer to do it by means of cams o placed upon the shaft b of the huller, said cams engaging with levers p attached to the screen-frame M . By a few revolutions of the shaft b the riddles are sufficiently shaken to thoroughly separate the coffee and take out all the dirt. The riddles are then taken out, and the contents emptied into proper receptacles.

When it is desired to operate the huller without operating the separator the levers p are moved out of reach of the cams, and held there by means of stop-pins or any other suitable device.

I do not claim the use of a screw and cylinder, broadly, for hulling coffee and other grains, as I am aware that the same has before been used; but

What I claim as my invention is—

1. The combination, with a cylinder and feed-chambers $E E$ and central discharge-opening k , of the right and left hand screws $B B'$ mounted on the same shaft, substantially as and for the purpose hereinbefore set forth.

2. The combination, with the feed-chambers $E E$ and central pressure-chamber F , of the cylinder D and right and left hand screws $B B'$ arranged upon one shaft, substantially as and for the purpose hereinbefore set forth.

3. The screws $B B'$, each formed of sections, having the threads of one section arranged intermediate of the threads of the other section, substantially as and for the purpose hereinbefore set forth.

4. The combination, with the screws $B B'$, of the inclosing-cylinder D , corrugated, substantially as and for the purpose hereinbefore described.

5. The combination, with a cylinder and hulling-screw, of the section C arranged at the feed end, and having threads of less pitch than the screw, substantially as and for the purpose hereinbefore set forth.

6. The combination, with the feeding and pressure compartments $E E F$, of the adjustable gates or partitions g , substantially as and for the purpose hereinbefore set forth.

7. The combination, with the pressure-chamber F , of weights or balls J for increasing the pressure, substantially as hereinbefore set forth.

8. The combination, with the end feed-chambers $E E$ and central pressure-chamber F , of the V -shaped deflector H , substantially as and for the purpose hereinbefore set forth.

9. The combination of the adjustable agitator I , arranged within the central pressure-chamber F , and right and left hand screws $B B'$, substantially as and for the purpose hereinbefore set forth.

H. B. STEVENS.

Witnesses:

JOHN J. BONNER,
C. J. BUCHHEIT.