

W. P. CLIFFORD.

Grain-Separators and Scourers.

No. 143,331.

Patented September 30, 1873.

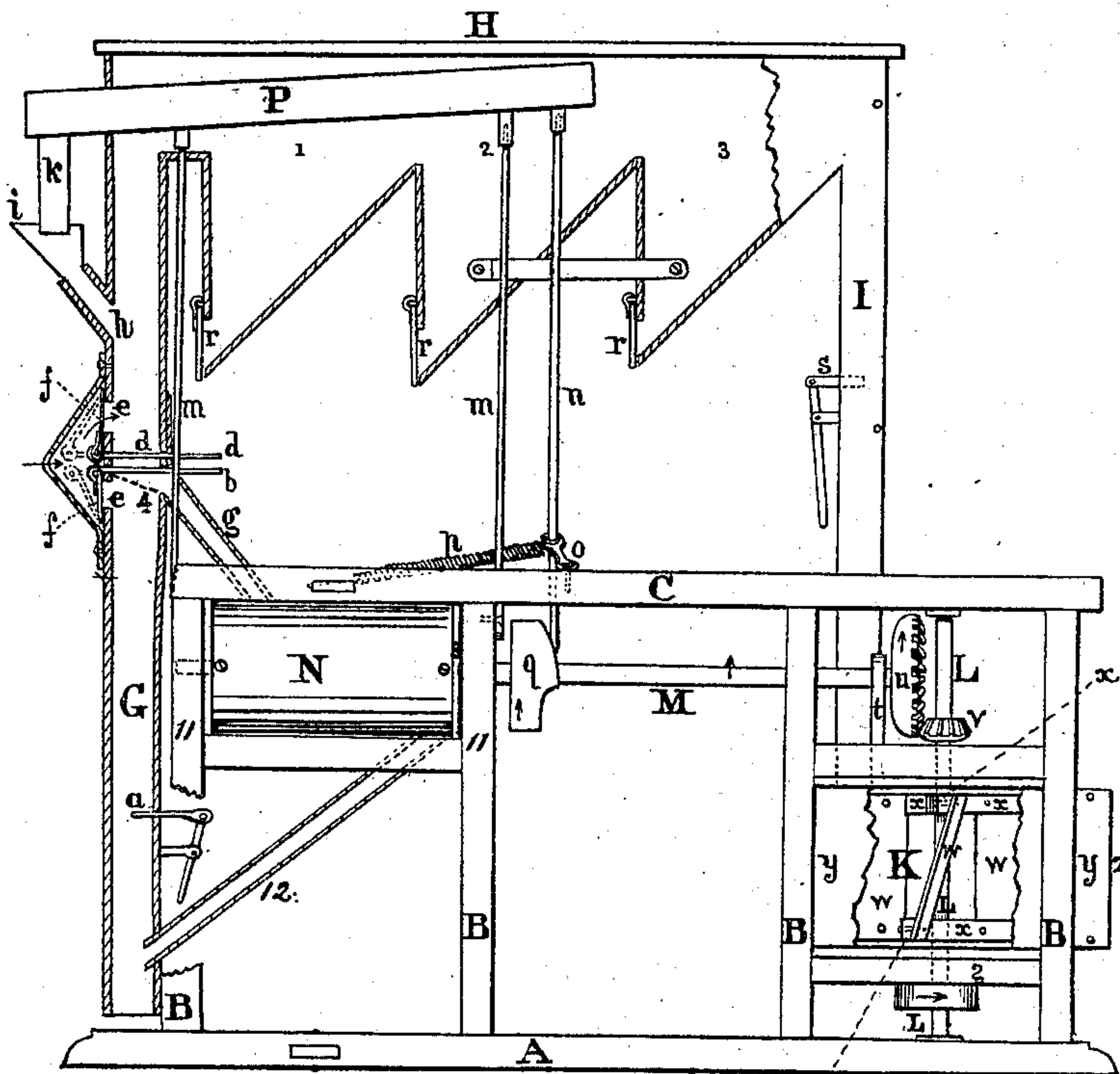


Fig. 1.

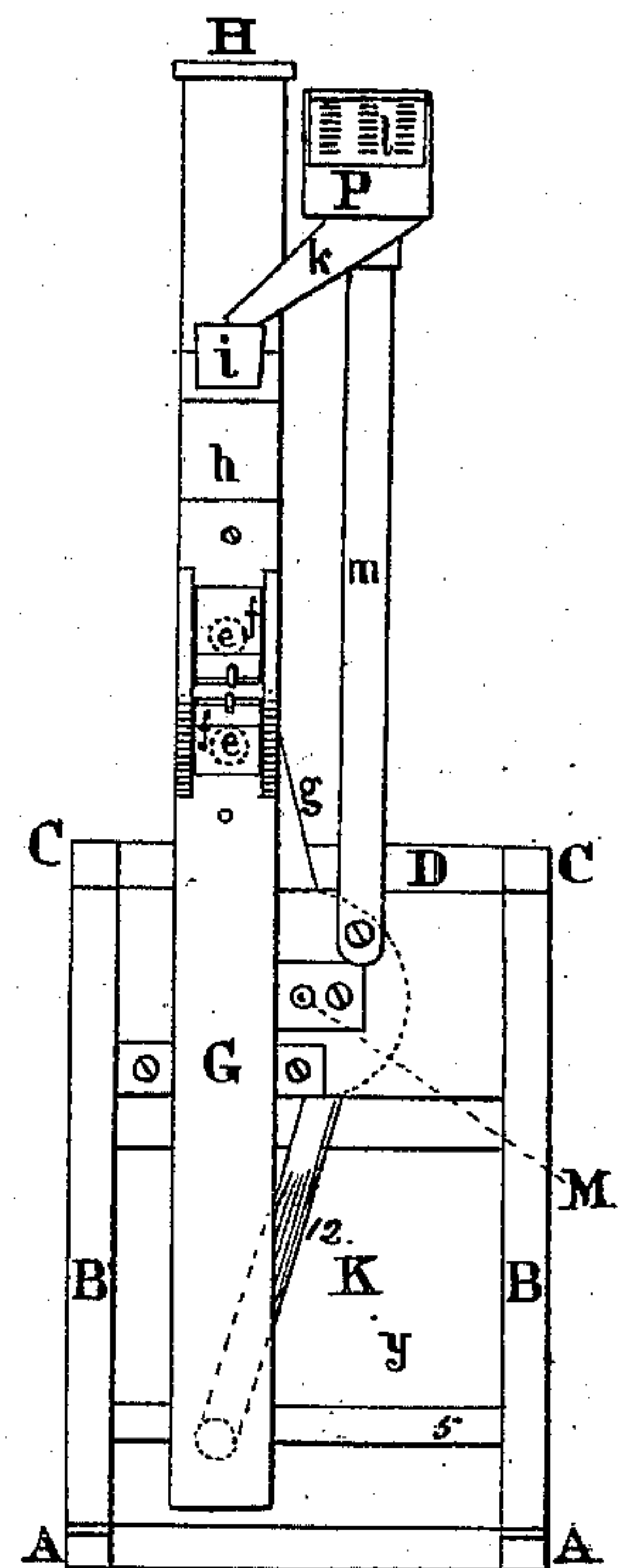


Fig. 3.

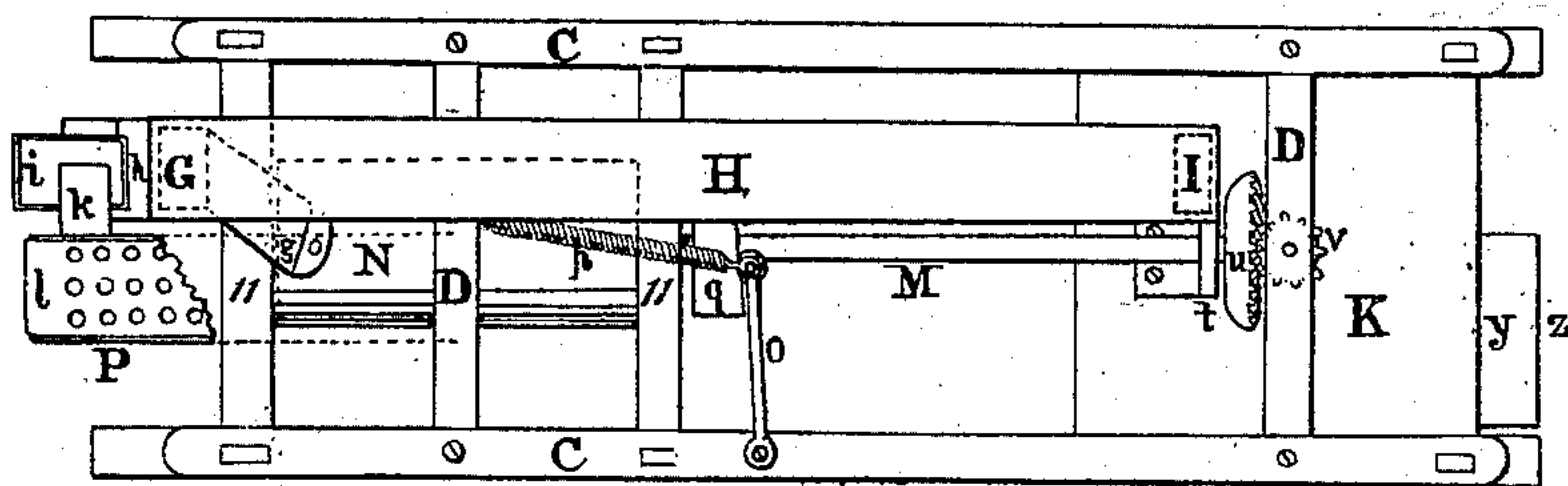


Fig. 2.

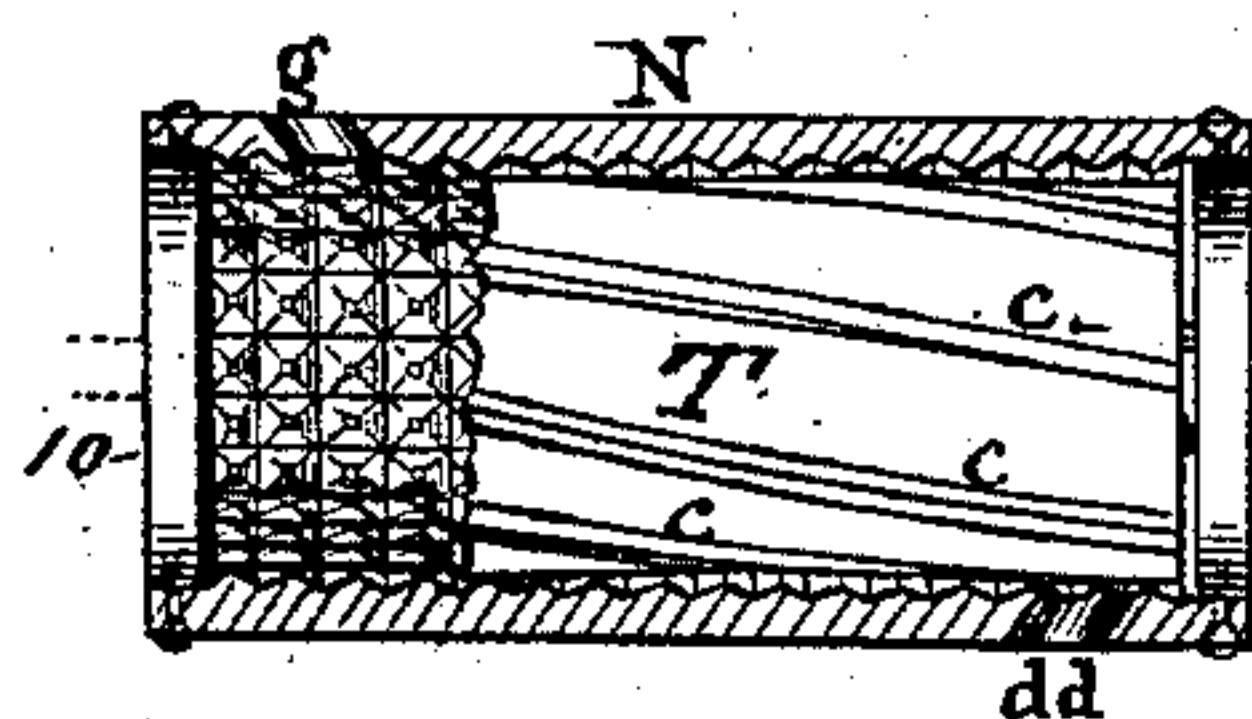


Fig. 4.

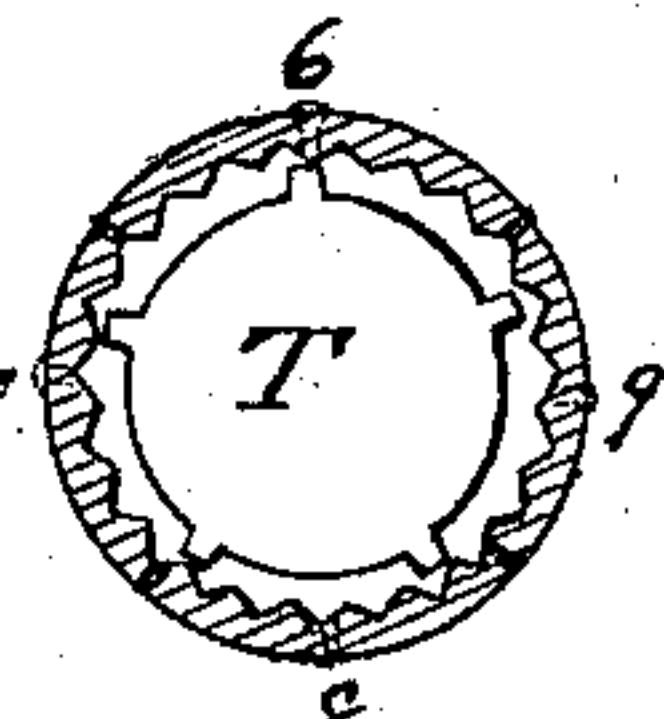


Fig. 5.

Witnesses  
James M. Albion.  
Edmund H. Quincy

William P. Clifford  
by E. Thurston  
his atty in fact



# UNITED STATES PATENT OFFICE.

WILLIAM P. CLIFFORD, OF WEST JERSEY, ASSIGNOR OF ONE-HALF HIS  
RIGHT TO LEWIS AND JEREMIAH GARRISON, OF ELMORE, ILLINOIS.

## IMPROVEMENT IN GRAIN SEPARATORS AND SCOURERS.

Specification forming part of Letters Patent No. **143,331**, dated September 30, 1873; application filed  
March 22, 1873.

*To all whom it may concern:*

Be it known that I, WILLIAM P. CLIFFORD, of West Jersey, in the county of Stark, in the State of Illinois, have invented a new and useful Improvement in Grain-Separators; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the annexed drawings making a part of this specification, in which the letters of reference refer to like parts, and in which—

Figure 1 represents a sectional elevation, the side covering of the spouts and grading-chambers being removed. Fig. 2 is a plan view. Fig. 3 is an end view from the hopper side of the machine. Fig. 4 is a vertical section of cylinder-chamber and view of part of the surface of the cylinder. Fig. 5 is a vertical cross-section of cylinder-chamber and end view of rotating cylinder.

This invention combines a rotary cleaning-cylinder, fan, and fan-drafts with spouts and grading-chambers for grading grain by weight; and consists of a fan-box and fan having inclined vanes or fans, the shaft of which gears with the shaft of the scouring-cylinder (by means of the usual wheels.) The latter carries on its surface "ribs" spirally arranged, and is inclosed in a cylinder or jacket, whose inner surface is covered with teeth. This cylinder receives the grain from a spout, the grain passing through an upward draft of air, which carries off the dust, &c., and, being scoured and again passed into said draft, is blown to the top of the grading-box—a long longitudinal chamber on the top of the machine having several divisions, that one nearest to the vertical upward blast receiving the heaviest grain, the next a slightly lighter grade of grain, and so continuously for several different grades or qualities of the same, the heaviest and best grain settling or being left by the blast first.

I construct my machine as follows: A A represent the sills on which the square frame B B, C C, and D D are erected. G is a vertical fan-draft, originating below the discharge-spout 12 of the scourer N, and, passing upward, opens into one end of a horizontal chamber, H, which has several minor pockets, 1 2 3, (or more,) with flaps *r*, &c., for spouting away the

received grain. These are the grading-chambers. The last one opens into the top of a downward-blast passage, I, which enters the fan-box R *y*. In this spout or passage I is a valve, *s*, for regulating the force of the blast in grading. In the entrance blast-passage or fan-draft G is also another air-regulating valve, *a*, above the grain-spout 12. Near the top of the passage G is the grain-hopper *i* and spout *h*. Below this spout are two valves, *f f*, and valve or draft openings *e e*, which are opened and closed by means of the horizontal rods or handles *d b*, which open the valves outward (in the positions indicated by the dotted lines.) Between these openings *e e*, and filling the passage G, is a screen or sieve, 4, which terminates at the entrance of the grain-spout *g* which directs grain to the scourer N. R is the fan, and *y* the box (the tail is seen at *z*.) It is of the ordinary construction, save the inclination of the fans *w w*, &c., which are inclined from a perpendicular, and their upper ends lean forward in the direction of their rotation. The box *y* is seated upon the platform 5 between the vertical posts B B, and receives the leg of the vertical blast or suction passage I; L, a vertical shaft carrying the fan R and driving-pulley, also, pinion V gearing with pinion *u* of the scourer N; M, the horizontal shaft, on which the scouring-cylinder N N is attached. At one end a pinion, *u*, gears with the fan-shaft, and near the scourer N a cam, *q*, or means to oscillate the rod *n* of the shaker P is placed on the shaft next to the scourer N. N, the scouring-cylinder, in which revolves the rotary scourer T. The inner surface of N is covered with iron teeth, similar to those of shelling-machines. (See N, Fig. 4.) This cylinder or shell is made in sections 6 7 8 9 running lengthwise of the same, each piece being attached at either end to a head or disk, 10 10, with adjusting screws or bolts, or an equivalent adjustment of the sections 6 7 8 9 nearer to or further from the rotary cylinder T to regulate the slower or quicker passage of the grain between the cylinders N T. T, the rotary scouring-cylinder, which, when the spiral or curved ribs *c* are considered, nearly fills the outer cylinder N. It is set upon or carried by the shaft M,



centered on each of the heads 10 10, which is attached to the boards or supports 11 11, which, in turn, are attached to the posts B B, behind the spout or air-passage G. It is provided with several ribs, *c*, arranged around the surface diagonally, and may run from end to end. There are six ribs represented, each rib turning one-sixth of the cylinder, each being so placed as to gradually convey the grain to the passage 12 at the outer and lower end of the cylinder N. The grain enters by the passage *g* at the top of the cylinder N. In place of ribs *c*, the cylinder T may have lines of blunt teeth or conveying flights arranged in a similar direction on its periphery, and which will still tend to convey the grain to the opposite end of the cylinder to which it enters. So, in like manner may the toothing of the cylinder N be constructed and arranged. P represents a hopper or shaking-trough, supported in an inclined position at the side of the box H, upon elastic supports *m m*, rising from the frame A B, and is oscillated by the upright *n*, which is pivoted at the middle to a convenient point, (as the side of the box H,) and below held by an arm, *o*, and a spring, *p*, against the face of the cam *q* on the shaft M. The outer end of this trough P has a spout, *k*, which conducts into the hopper *i* of the upper part of the blast-passage G. A perforated board or screen, *l*, prevents the passage of straws or other rubbish, which is thus shaken off at the open lower end of the trough.

The operation of this machine is as follows: It separates the light grain, chess, weed-seed, smut, &c., from wheat, oats, &c., by means of a fan-draft, which enters the lower end of passage G and *e e* in the same passage, and thence along the top of box H, and down the passage I into the fan R. The grain, entering the machine by the shaker P, spout *k*, hopper *i*, and passage *h*, strikes the blast at *h* in the passage G, where the first separation occurs, the oats, light wheat, chess, smut-balls, &c., being carried away upward. The wheat falls upon the screen 4, which conducts it into the scourer N T, whence it emerges again into the blast-passage G, through the spout 12, where the grain undergoes another separation, falling

thence into the stock-hopper ready for grinding. By operating the valves *a f f* the miller can make any separation which he desires, light wheat and heavy oats falling into chamber 1, light oats, screenings, and chess into chamber 2, light screenings, chess, weed-seed, &c., into chamber 3. The valves *r r r* at the bottom of these chambers open as the latter fill up, and offal is conducted away and dust, chaff, straws, light smut-balls, and scourings pass off through the fan. The fan has vanes of one inch or more divergence from verticity at the top, or leaning in the direction of their revolution, which confers a greater suction-power in the fan as a unit. The valves *f f* in the passage G regulate the blast in the latter, together with the valves *a* and *s*, the opening of the valves *f f* causing the blast supplied by fan R to pass through the orifices *e e*—as, for instance, in certain stages of the operation, it might not be desirable to permit the full force of the blast to be expended upon the screen 4 after the first cleaning. Thus, to avoid this, the blast, or a portion of it at least, is diverted around the screen through the orifices.

What I claim as my invention is—

1. The combination of blast-passage G, grain-entry *h*, valves *a f f*, chamber H, subdivided chambers 1 2 3, valves *r r r*, blast-passage I, fan R, and box *y y*, all constructed and arranged to operate in the manner and for the purpose as herein shown and set forth.

2. The combination of blast-passage G, valve *a*, air-passages *e e*, valves *f f*, screen 4, grain-ducts *g* 12, and scourer N, all substantially as and for the purpose set forth.

3. The combination and arrangement of the frame A A, B B, C C, and D D, fan R, box *y y*, shaft L, pinions *v u*, shaft M, cam *q*, scourer N T, shaker-rod *n*, arm *o*, spiral spring *p*, shaking-trough P, spout *k*, hopper *i*, and supports *m m*, all substantially in the manner and for the purposes as set forth.

WILLIAM P. CLIFFORD.

Witnesses:

JAMES M. MORSE,  
HENRY W. WELLS.