2 Sheets—Sheet 1.

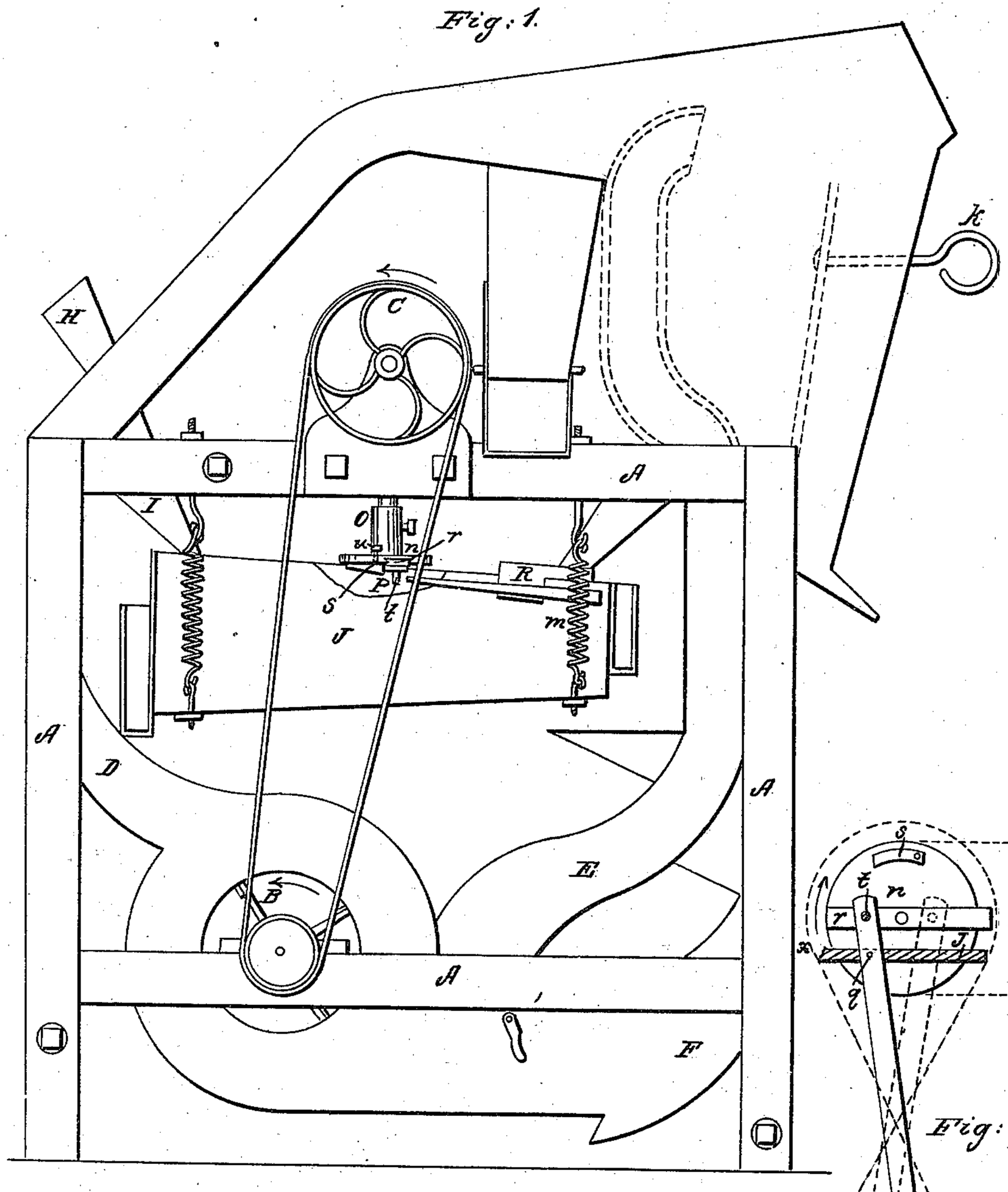
B. T. TRIMMER.

Grain Winnower.

No. 21,036.

Patented July 27, 1858.

Fig. 1.



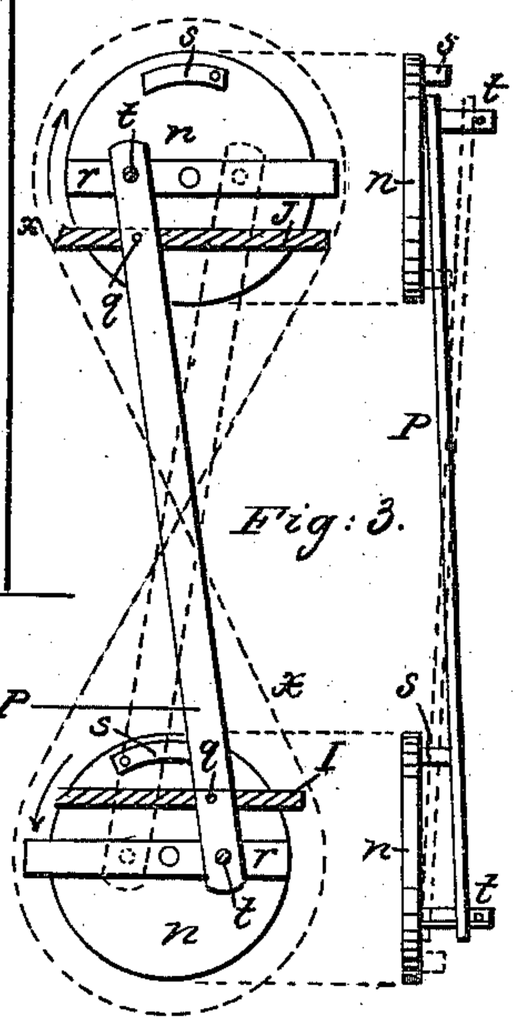


Fig. 3.

2 Sheets—Sheet 2.

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Patented July 27, 1858.

Fig: 2.

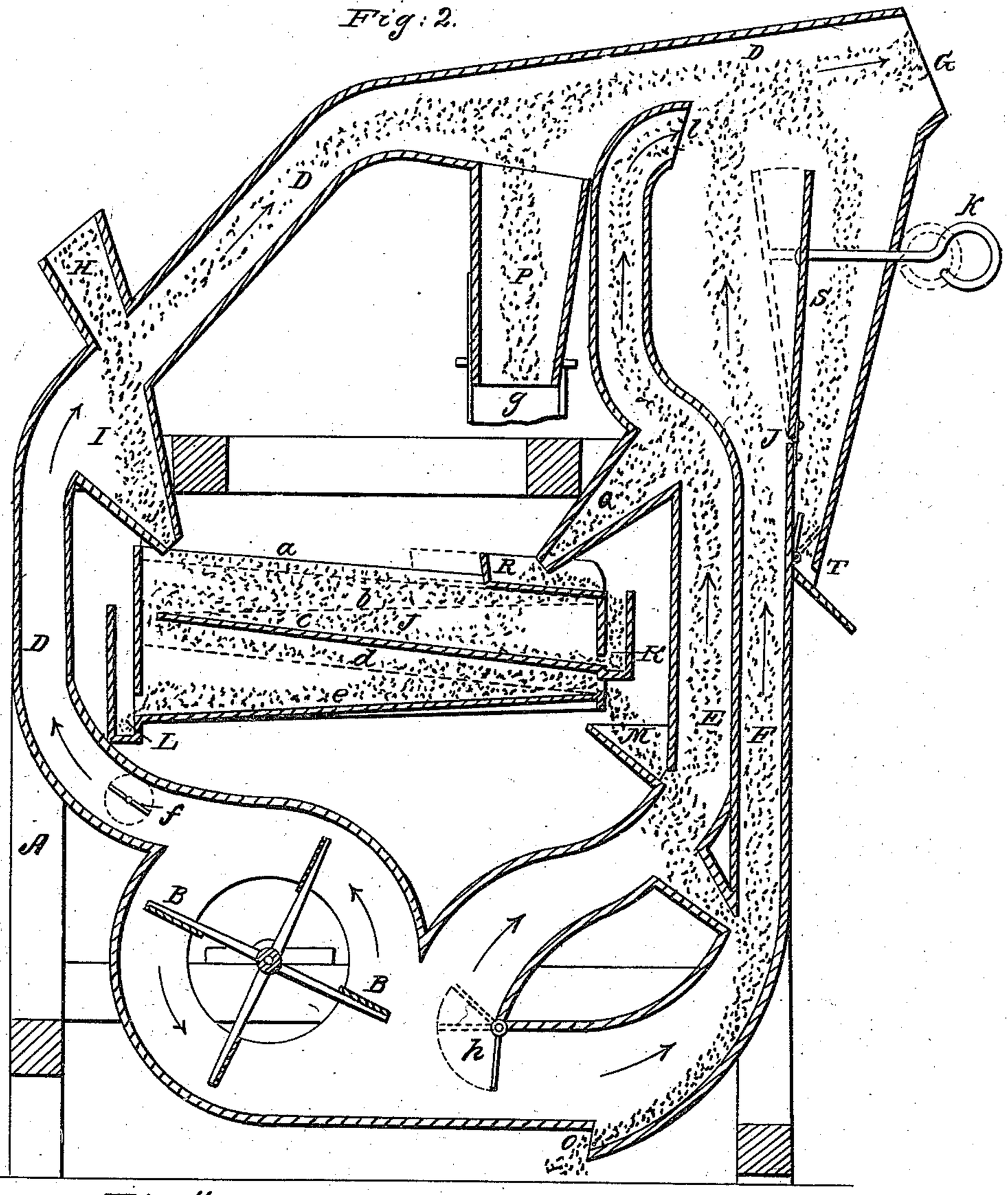


Fig: 4.

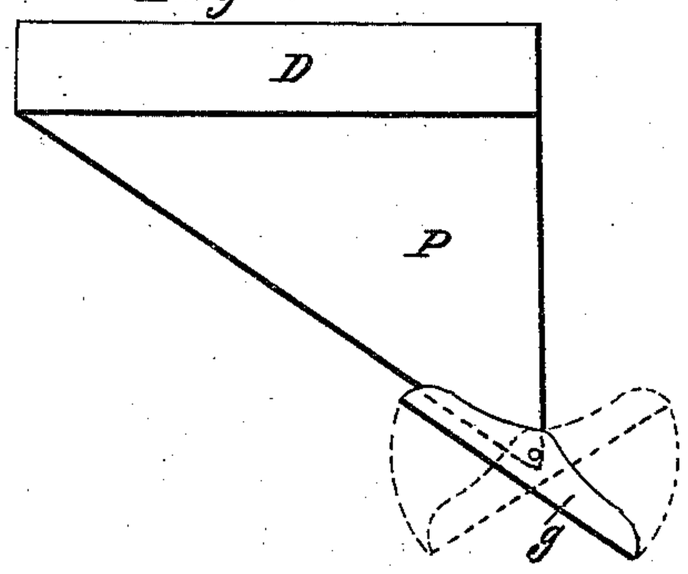
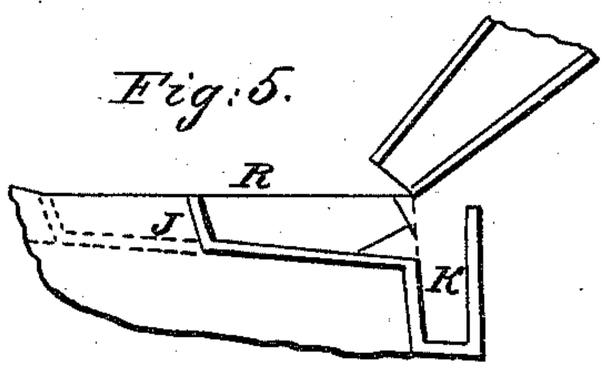


Fig: 5.



UNITED STATES PATENT OFFICE.

B. T. TRIMMER, OF ROCHESTER, NEW YORK.

MACHINE FOR CLEANING GRAIN.

Specification forming part of Letters Patent No. 21,036, dated July 27, 1858; Reissued September 29, 1863, No. 1,545.

To all whom it may concern:

Be it known that I, BENJAMIN T. TRIMMER, of the city of Rochester, in the county of Monroe and State of New York, have made and invented certain new and useful Improvements in Machines for Cleaning Grain, of which the following is a full and accurate description, reference being had to the accompanying drawings, making part of this specification, and to the letters of reference marked thereon, the same letters referring to like parts in all the figures.

Of said drawings Figure 1 is a side elevation of my improved machine. Fig. 2 is a longitudinal section of the same and Fig. 3 shows the mode of communicating motion to the screen.

The nature of this invention will be best understood from a description of its construction and mode of operation.

A A, is the frame of the machine.

B, is a fan blower driven by a band from the pulley C, to which any convenient driving power may be applied. The blast engendered by fan B, is driven through the three blast tubes D, E and F, which unites in one discharge at the opening G. The grain is introduced through the spout H, falling through the first blast D, into the lower spout I, whence it discharges upon the coarse screen of the shaker J. Blast D, is so graduated as to carry off the lighter impurities, and the screen *a* is sufficiently coarse to allow the grain to pass through it but retains any coarse matter such as chaff, oats, &c., which is carried down by its inclination into the inclined spout K, by its side, and by it is discharged outside of the machine. *b* is a fine screen which retains the grain, but passes the chess and other small seeds, which drop on the board *c*, the surface of which inclines in the same direction of the first screen *a*, and discharges also into the spout K, but the fine screen *b* inclines in an opposite direction discharging the grain over the end of board *c* upon another fine screen *d* inclined in the same direction as *c*. The finer matter which passes through this screen falls on the lower incline board *e* and is carried into the side spout L, whence it is discharged as from K. The wheat or grain thus screened falls into the spout M, and thence falls through the second blast E, into spout N, which conveys it into blast tube F. In this tube the direction of its fall carries it across the blast, and it is received by the concave surface of the tube, and descends to the point of final discharge at O, where it issues from the machine thoroughly cleansed of all impurities by the conjoint operation of the various screens and blasts.

A valve *f* is placed in the throat of the blast tube D, by which the force may be regulated and adapted to the weight of the grain with great precision, but still there will be some lighter grains, and some portion of the chess, which will be carried upward, and to arrest these and prevent their being blown out with the dust, a cavity or deep expansion of the lower side of the tube is formed at P, for the purpose of weakening the current so that these matters will drop of their own weight. At the bottom of this an opening is made for discharging the matter thus obtained into the tilting spout *g*. This spout, represented separately in a side view in Fig. 4, turns upon a center or axis consisting of two pins, it being broad enough to inclose the mouth of P, and when inclined in one direction empties the grain, &c., upon the screens in the shaker J, to be acted upon again, or, if in the opposite direction, discharges it with the refuse outside of the machine.

A valve, *h*, at the junction of blast tubes E and F, regulates the force of the air driven through them. In order to secure a perfect separation of all impurities a strong blast through E is requisite, which will elevate some portions of the grain. By a sudden curve in the direction of the tube at *i* a considerable portion of this is deflected from its course, falling into the return spout Q. Here provision is made for passing it again over the screen, or rejecting it with the refuse if its quality is worthless. This consists in the sliding deflector R, which sits upon the top of the shaking box J, and is constructed to slide upon guides or ways attached to its side. In the position represented in Fig. 2, it receives the grain returned by spout Q, and being inclined like the upper screen deflects it into side spout K. If moved back, in the position indicated by dotted lines, the spout Q, discharges directly upon the screens, and the imperfect grain is again submitted to the ordeal of screen and blast. The separation of various kinds of grain, as oats, rye, &c. from wheat, and the removal of chess, cockle and shrunk wheat,

depends materially upon subjecting them to blasts of varied intensity such as are obtained by the triple arrangement of tubes which I employ, and by which I obtain a most perfect separation. The process is not complete until the grain has been passed through the blast tube F. Here the heaviest grain descends to the main outlet, O, but, as perfect separation of the lighter from the heavier grain is desirable, it is effected through this tube in connection with E. Its blast is regulated in part by valve *h*, but more fully by the movable diaphragm *s*, which separates tube F from the enlarged space of the blast-head in which the three terminate. It is hinged at *j*, and adjusted as required by the rod *k*. By moving it outward it forms, with the recess at the deflection of E, a largely expanded area which modifies the blast so as to allow the return of all but the lightest grain that may be drawn up it. It also receives that portion which the force of the current in E has carried up so as to emerge at *l*. By so moving the diaphragm as to contract tube F to a narrow space at *l*, the blast is strengthened, and the lighter grain from both E and F may be discharged above the diaphragm, and descend through the throat T, where it is discharged in a separate place. The dust and slight impurities are all discharged at G, the main outlet of the blast head.

By turning valve *h* in the position shown in Fig. 2, nearly all the blast is driven up tube E, and with a force sufficient, if required, to carry a greater part of the grain up E, and this may be returned through the screening box or shaker, again and again, or blown over at *l* and returned through tube F, where it is subjected to a lighter blast. This concentrating the blast through E increases that of D, but this may be regulated as found necessary by the valve *f*. Increasing and diminishing the space between *l* and the diaphragm S, also exerts an influence on the blast of D, for as that space is contracted the blast D is weakened by the expansion of the head, and will drop its heavier particles through T.

The arrangement of the several blast tubes, the movable diaphragm, and the valves, is designed to give the operator perfect control over his machine, enabling him to increase or modify the force of the blast while acting on the grain in its several passages through the blasts, thereby adapting it to the variations in the gravity of the grain, as well as to the cleaning and separating of different kinds of grain.

The shaker or screen box J, is operated with a vertical vibratory motion and horizontal sweeping motion at the same time. It is suspended by four coiled springs *m* one placed at each corner. Directly above it two disks or wheels *n* are hung at the end of vertical shafts O. To the lower face of these disks a rod *p* is attached to pins which form cranks. The pins are placed at opposite relative positions to the shafts of the wheels, so that when rotated in opposite directions the ends of the rod *p* are made to revolve also in opposite directions giving a compound circular, or gyratory movement as represented by the dotted lines *x x* in Fig. 3, which is an inverted plan view of this arrangement. Bevel gears or other equivalent arrangement are employed to drive these cranks in their opposite directions. The rod *p* is attached to the top of the screen box J, causing it to pass through the same evolutions. Fig. 3, shows the screen-box as attached at *q*, and Fig. 1, represents the parts in elevation. To vary this sweeping motion the crank pins are attached to dovetailed slides *r* by which the crank may be made longer or shorter. To give the vibrating motion a wedge-shaped cam *s* is attached to the face of each crank wheel, so as to pass the rod *p* at each revolution. Play is given the rod on the two crank pins *t*, Fig. 3, and the springs *m* hold it against the face of the wheels until it is raised by the point of the cams. As the cam passes the rod the springs throw it back to its former position. The cams are so placed on the wheels that one end of the rod is passed by one before the opposite end is reached by the other, thus increasing the vibrations produced upon the screens. These cams are raised and lowered at the thick end by means of a set screw *u*, to give greater or less motion as required. The effect of this compound gyrating and vibratory motion upon the grain in passing the screens is very thorough, the motions being a close imitation of the natural operation of the human hands in screening. By means of this the horizontal motion of the screening surface is varied so as to give the greatest range of motion to the edges or exterior parts while the center is comparatively quiet. This tends to overcome the centrifugal tendency of the grain whereby it is apt to clog at the borders of the screens and reduce their superficial area.

On some grains the use of the cams *s* may be dispensed with as they do not require such vigorous shaking.

What I claim as my invention and desire to secure by Letters Patent, is—

1. Giving the screens an unequal, reversable, gyratory motion for the purpose of neutralizing the centrifugal force of the grain and retaining it in the center thereof, in combination with the vertical vibratory motion, by means of the double reverse acting cranks *n n*, cams *s*, and springs *m*, or their equivalents, arranged and operating substantially in the manner and for the purpose set forth.

2. I also claim the combination and ar-

rangement of the blast generator B, triple blast tubes D, E and F, and their valves *f*, *h* and movable diaphragm S, with the screen box J, and return spouts P and Q, operating conjointly for separating, screening and returning the grain, and for increasing, diminishing and modifying the blasts for the various purposes required, substantially in the manner set forth.

3. I further claim the adjustable deflector R, in combination with the screen box J, for returning the lighter grain through the screens and resubjecting it to the blast, or discharging it as refuse, as described.

B. T. TRIMMER.

Witnesses:
JOHN PHIN,
G. S. NEWELL.

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