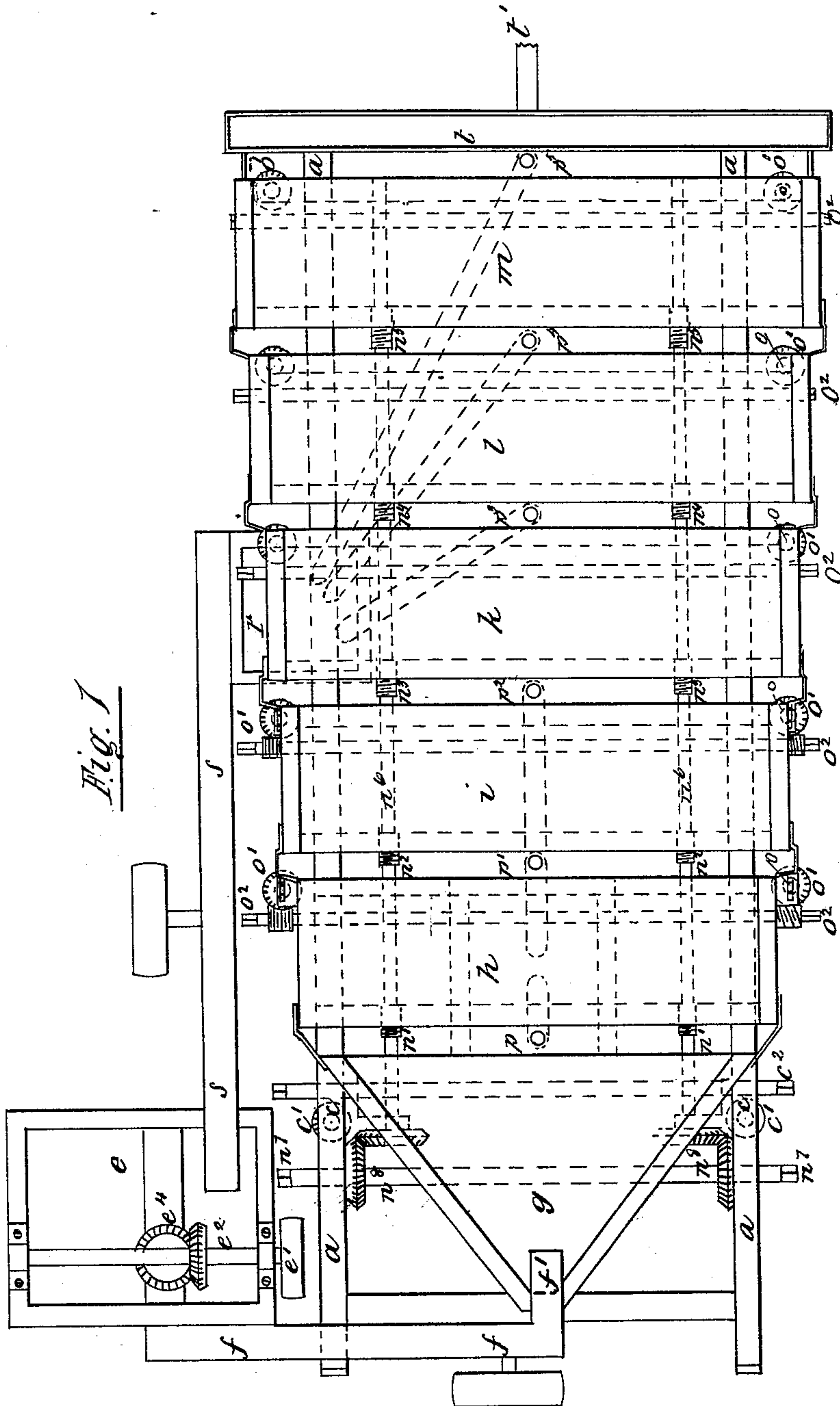


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Machine for Screening Shot.

No. 218,380.

Patented Aug 12, 1879.



Witnesses.
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Inventors.
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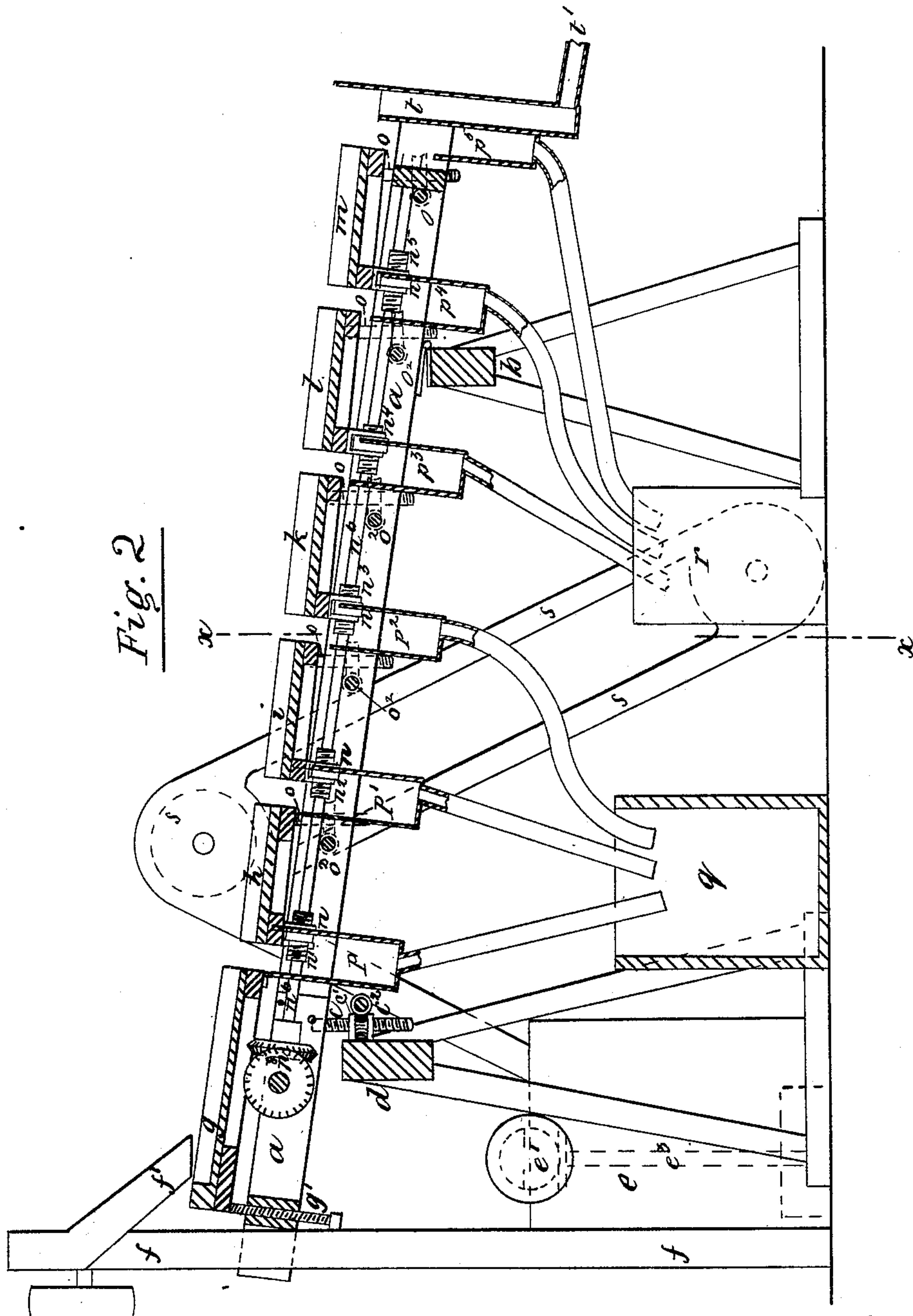


Fig. 2

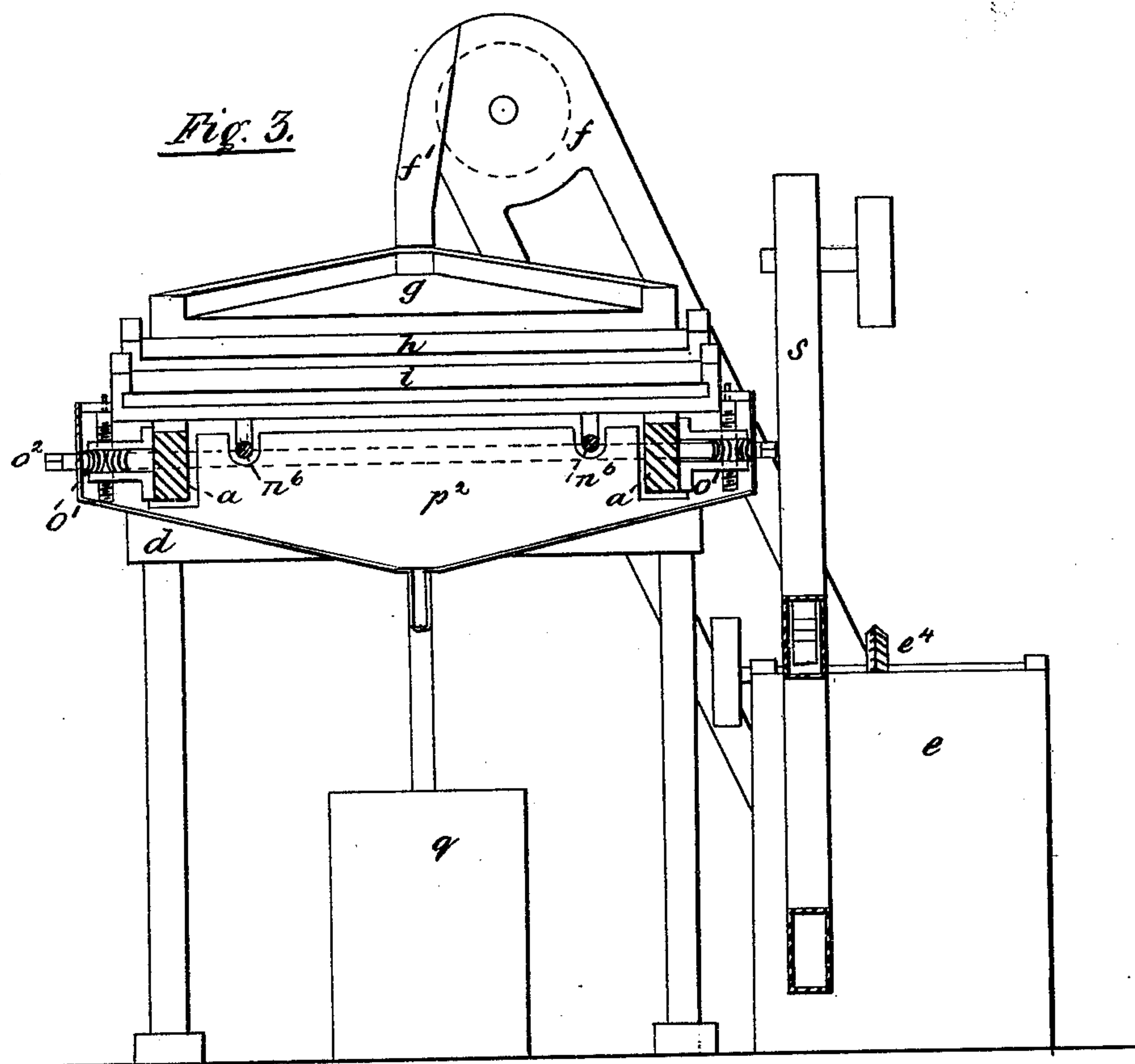
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UNITED STATES PATENT OFFICE.

JAMES E. GRANNISS, OF NEW YORK, N. Y., AND LEWIS W. TRACY, OF PHILADELPHIA, PA.

IMPROVEMENT IN MACHINES FOR SCREENING SHOT.

Specification forming part of Letters Patent No. **218,380**, dated August 12, 1879; application filed March 22, 1879.

To all whom it may concern:

Be it known that we, JAMES E. GRANNISS, of the city of New York, county and State of New York, and LEWIS W. TRACY, of Philadelphia, county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Machines for Screening Shot, of which the following is a specification.

This invention relates to screening-tables, or that class of machines used in the manufacture of lead shot for separating the perfect from the imperfect ones; and it has for its object to facilitate the adjustment of the various parts of the machines, and to overcome the objections to the wooden inclined sections down which the shot roll, as the surface of said wooden inclined sections becomes roughened or furrowed from the continual rolling action of the shot thereon, which causes some of the imperfect shot to roll and not slide down the inclined section, so that they have about the same momentum as the perfect ones, and jump over the spaces or gaps between the various inclined sections, and so pass out of the machine with the perfect ones, instead of falling into the gaps and down chutes arranged to guide them into a receptacle, from which they are taken and remelted.

We overcome this objection by substituting plate-glass for the wooden inclined sections, and as glass always maintains a true and smooth surface, the shot spread out in rolling down the inclines, and those which are not perfectly round, or which have flat surfaces, are caused to slide instead of rolling down the inclined section as soon as a flat surface of the shot comes in contact with the glass, thereby retarding the velocity of them sufficiently to cause them to fall into the gaps or spaces between the inclined sections, thus enabling us to obtain a better class of goods, as all the shot that leave the machine are perfectly formed.

The improvements for facilitating the adjustment of the machine consist in connecting the inclined sections together by means of two shafts, provided with sections of screens

of varying pitch, which, when turned, so act on the inclined sections as to regulate the width of all the gaps or spaces simultaneously; also, in making the receiving-board on which the shot enter the machine adjustable independent of the other parts of the machine; also, in making the inclination of the various sections independently adjustable by means of worm-gearing, and also in providing means for regulating the inclination of the whole table, all of which will be fully hereinafter described, by reference made to the three sheets of drawings accompanying this specification, and forming a part thereof, in which—

Figure 1 is a plan view of our improved screening-table. Fig. 2 is a central sectional longitudinal elevation, and Fig. 3 is a transverse sectional view cut through the line *x x*.

The main frame *a* of the screening-table is secured by means of hinges near the lower end to the supporting trestle-frame *b*, and at the upper end it rests on two short vertical screws, *c c*, secured to the supporting-frame *d*. On the screws *c c* are the worm-wheels *c¹*, which are tapped to fit the threads of the screws. They are free to rotate, but are held in the bearings, so that they have no lateral movement. The horizontal shaft *c²*, which has bearings also on the supporting-frame *d*, is provided with two worms, of a pitch corresponding to the teeth on the worm-wheels *c¹*, and meshing therein, so that as said shaft *c²* is turned the worm-wheels cause the screws *c c* to move up or down, according to the direction of the rotation of the shaft *c²*, and as the upper end of the frame *a* rests on these screws, the inclination of the frame is adjusted as required, thus simultaneously adjusting all of the inclined sections, as they are all carried by this frame.

The shot to be screened are placed in the receptacle *e*, which is provided with a stirrer, operated by means of a belt running over the pulley *e¹*, secured to the shaft *e²*, which is connected to the vertical stirrer-shaft *e³* by the miter-wheels *e⁴*. This stirrer causes the shot to fall into the shoe of the elevator *f*, which

carries them up and delivers them by the spout f' upon the triangular receiving-board or incline g . The lower end of this board is hinged to the main frame a , and it is adjusted independently of the main frame by means of the screw g' , which passes through the main frame and supports the upper end of the receiving-board g , so that by turning the screw such an inclination may be given the board g that the initial velocity of the shot shall be such as to cause only the perfect ones to jump over the gaps or spaces in passing from one inclined section to another.

These inclined sections $h i k l m$, of which there may be any number required, but which we generally limit to five, as shown in the drawings, are composed of plates of glass held in wooden frames.

The application of smooth plates of glass to this purpose we find obviates all the difficulties attending the use of the wooden inclines heretofore employed, which after a short time become roughened or furrowed, and so cause some of the imperfect shot to roll instead of sliding down them, and thus, having about the same momentum as the perfect ones, they jump over the gaps between the incline sections, and so mix with the perfect ones.

We are aware that iron and marble tables have been used in ore-separators, &c.; but the nature of these materials is such—their surfaces being somewhat rough—that they do not answer as well as smooth plate-glass for the incline sections of screening-tables for lead shot, for as soon as any flat places on the shot come in contact with the glass the shot slide down the glass, on account of the small amount of friction between them, and the momentum of such imperfect shot is sufficiently overcome as to cause them to fall into the gaps, and not pass out of the machine with the perfect ones.

On the upper end of each one of the wooden frames, which hold the plates of glass, are fastened two forked bearings, which surround the nuts $n n$ in such a manner as to prevent the nuts from turning, but yet allow the frames to rock thereon. These nuts $n n$ are tapped out to fit on the screws $n^1 n^2 n^3 n^4 n^5$, secured to the two longitudinal shafts $n^6 n^6$, which rotate in bearings secured to the main frame a .

The pitch of the screws $n^1 n^2 n^3 n^4 n^5$ varies in such a manner that when the shafts $n^6 n^6$ are rotated the inclined sections $h i k l m$ move to or from one another, and so regulate the width of the gaps between them, but maintain always the same width of gap between all the sections—i. e., the pitch of the screws and nuts $n^2 n^2$ under the section i equals twice the pitch of the screws $n^1 n^1$ under the section h , and so on increasing till the pitch of the screws and nuts $n^5 n^5$ under the section m is five times the pitch of the first ones.

It will be observed, by reference to Fig. 1, that the inclined sections increase in width from the upper to the lower one, the object of

which is to allow the shot more room as they spread apart in rolling down them.

The two shafts $n^6 n^6$ are operated by the transverse shaft n^7 , to which they are connected by the miter-wheels $n^8 n^8$. The lower end of each of the sections $h i k l m$ rests on two vertical screws, $o o$, and the upper ends of them rest on the nuts $n n$, surrounding the screw-shafts $n^6 n^6$, on which they rock as the lower ends are vertically adjusted. The screws $o o$ are operated by means of worm-gearing $o^1 o^1$, secured to the shafts $o^2 o^2$, which have bearings in the main frame a , and which operate to regulate the inclination of each section independently in the same manner as the main frame a is regulated by screws and worm-gearing $c c^1 c^2$; so a particular description of them is unnecessary, the foregoing description of $c c^1 c^2$ being applicable to them. Secured to the upper end of each of the inclined sections is a pocket or hopper, $p p^1 p^2 p^3 p^4$, arranged to catch the imperfect shot as they fall through or into the gaps or spaces between the sections, and secured to the lower end of the main frame a is the pocket or hopper p^5 . Each one of these hoppers is provided with a duct, which conveys the imperfect shot into two receptacles. Those which fall into the first three hoppers, $p p^1 p^2$, are conveyed into the receptacle q , from which they are taken to be remelted, as the very imperfect ones are the first to fall; but those which fall into the last three hoppers, $p^3 p^4 p^5$, are conveyed into the receptacle r , from which they are taken by means of the elevator s and deposited back in the receiving-receptacle e , to be again passed over the inclines. All the perfect shot, as they leave the last inclined section, m , fall into the hopper t , from which they pass by means of the duct t' , which is generally connected to a machine for sorting or grading the shot.

Having now described our invention, what we claim, and desire to secure by Letters Patent, is—

1. A machine for screening lead shot, in which the inclined sections are made of glass, substantially as and for the purpose hereinbefore set forth.

2. The main frame a , carrying the inclined sections, in combination with the worm-gearing adjusting device $c c^1 c^2$, substantially as hereinbefore set forth.

3. The inclined sections $h i k l m$, in combination with the main frame a and adjusting worm-gearing $o o^1 o^2$, whereby said inclined sections may be independently adjusted, substantially as hereinbefore set forth.

4. In a screening-table, the inclined sections h, i, k, l , and m , controlled by the shafts $n^6 n^6$, provided with the screws $n^1 n^2 n^3 n^4 n^5$, of varying pitch, as described, and operating to simultaneously alike vary the gaps between the sections, substantially as hereinbefore set forth.

5. The combination of the inclined sections $h i k l m$, provided with means for simultane-

ously adjusting them to and from each other and independently vertically adjusting them, and the adjustable receiving-board *g*, with the main frame *a*, provided with means for vertically adjusting it, whereby the inclination of all the sections is simultaneously adjusted, substantially as hereinbefore set forth.

In witness whereof we have hereunto set our hands this 3d day of March, 1879.

JAMES E. GRANNISS.
LEWIS W. TRACY.

Witnesses:

CHARLES HUBBARD,
F. B. LAWRENCE.