

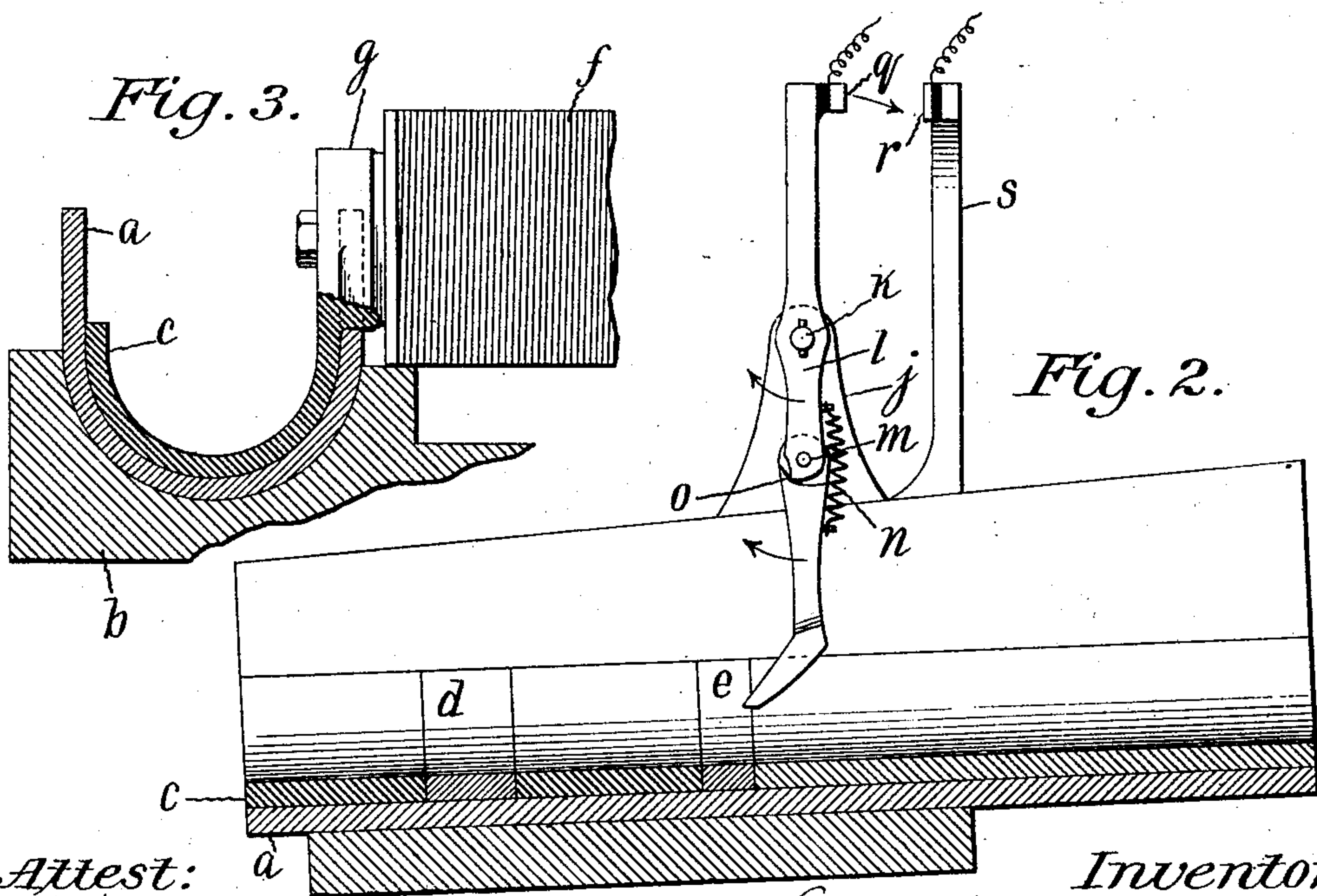
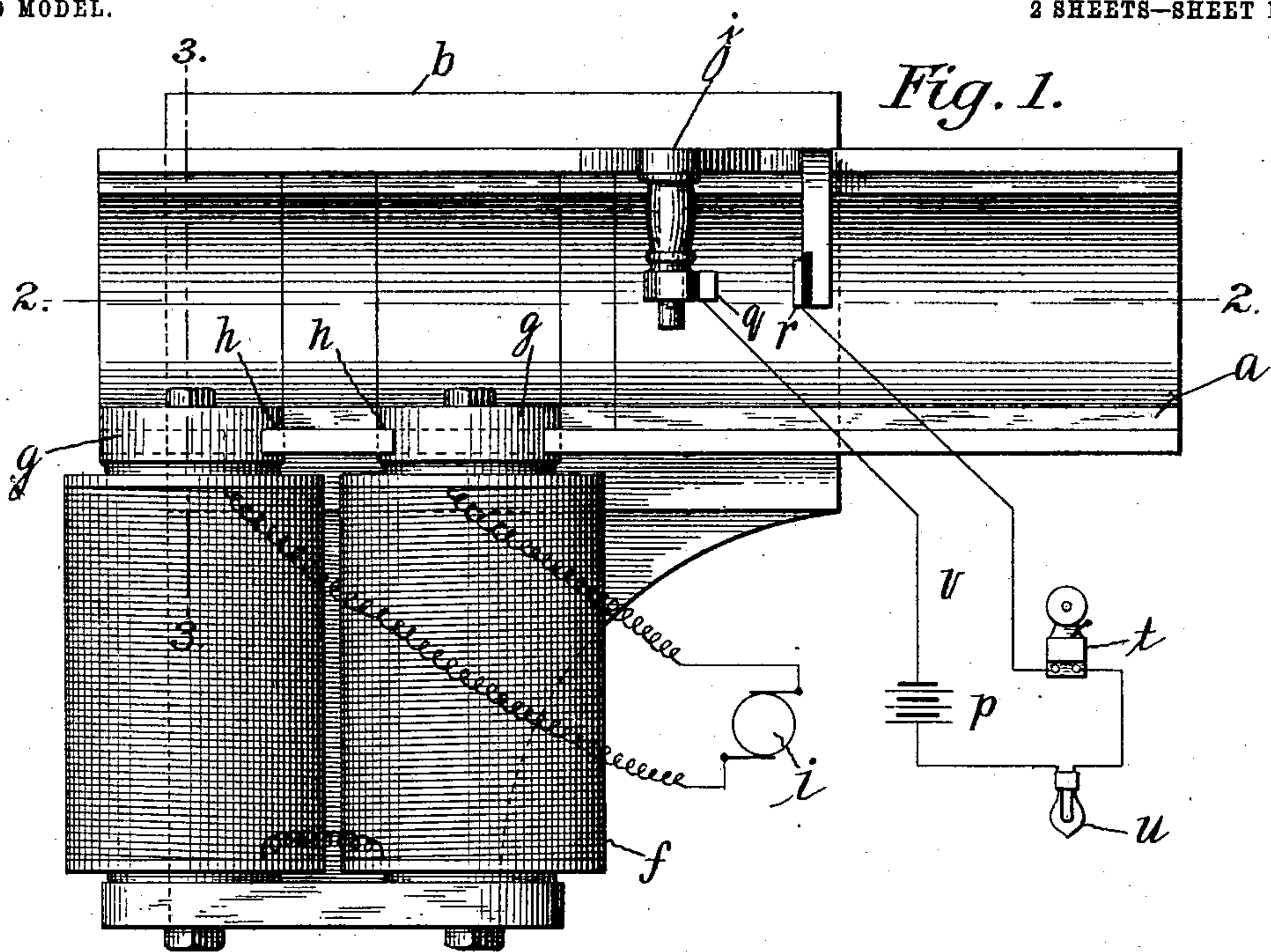
No. 720,156.

PATENTED FEB. 10, 1903.

J. KIRSCHWENG.
MAGNETIC SEPARATOR.
APPLICATION FILED AUG. 17, 1901.

NO MODEL.

2 SHEETS—SHEET 1.



Attest:
A. N. Jesbera.
Lucius E. Varney.

Inventor:
John Kirschweng
by Redding, Kiddo & Greeley
Attys.

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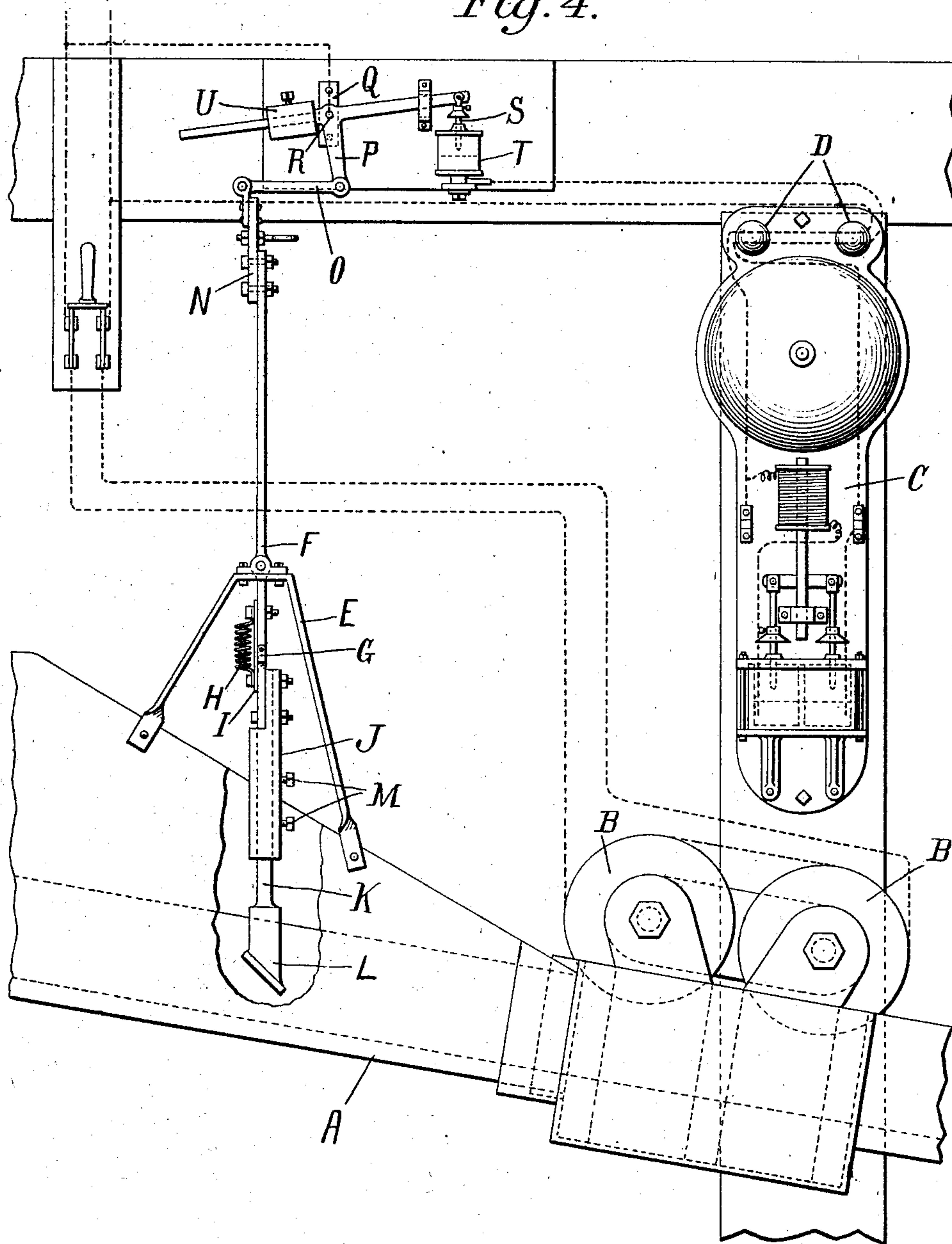
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2 SHEETS—SHEET 2.

Fig. 4.



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Lucius E. Varney

Inventor:
John Kirschweng
by Redding, Kiddle, Greeley
Attys.

UNITED STATES PATENT OFFICE.

JOHN KIRSCHWENG, OF BUTTE, MONTANA.

MAGNETIC SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 720,156, dated February 10, 1903.

Application filed August 17, 1901. Serial No. 72,371. (No model.)

To all whom it may concern:

Be it known that I, JOHN KIRSCHWENG, a citizen of the United States, residing in Butte, county of Silverbow, in the State of Montana, have invented certain new and useful Improvements in Magnetic Separators, of which the following is a specification, reference being had to the accompanying drawings, forming a part hereof.

This invention relates to the separation of magnetic substances from non-magnetic ores or from any other matter not susceptible of magnetic attraction.

In the mining of ores it frequently happens that drills and hammers and other steel tools are carried with the ore to the crushers, which are very often damaged in consequence. It is also desirable to remove from the ore as much of the free iron as possible either before or directly after the ore has passed the crushers, as the separation at this point is much more readily and cheaply accomplished than after the ore has passed the smelters.

The improved device combines with a simple form of separating device an automatic alarm to indicate the choking of the ore-chute, and means are provided whereby the alarm shall be continuous, while at the same time large pieces of ore are allowed to pass down the chute.

In the drawings, Figure 1 is a plan view of the separator. Fig. 2 is a vertical section on the line 2 2 of Fig. 1. Fig. 3 is a vertical section on the line 3 3 of Fig. 1. Fig. 4 is a diagrammatic view of another form of the invention.

A section of a launder or ore-chute *a*, constructed of some non-magnetic substance, as copper, is shown, having a suitable support or base *b* and provided with a steel lining *c*, which covers the bottom and extends halfway up the sides of the same. At *d* and *e* strips of brass are placed, separating the adjacent portions of said lining. Mounted at one side of the launder is an electromagnet *f*, the poles *g* of which extend through openings *h* in the upper side of said launder and are securely clamped to the steel lining, which is extended so as to cover the same. Said magnet may be energized by any desired form of electric supply and is represented in the drawings as connected with the

terminals of a dynamo *i*. A standard *j*, rigidly secured to the top of the launder on the side opposite the electromagnet, has a projection *k*, upon which an arm *l* is pivoted at its center. Said arm in its normal position rests nearly vertically at a point just in advance of the magnetic poles. It is formed of two separate pieces hinged together at *m* and is provided with a spring *n* and a detent *o* to hold the upper and lower parts of the same substantially in alinement when resting in its normal position. At the top of the upper part of said arm and connected with one pole of a battery *p* is a small metallic plate *q*, which contacts with a corresponding plate *r* on a standard *s* and closes the circuit to ring an alarm *t* and operate a light *u*.

When the separator is in operation, all the magnetic substances in the ore are collected between the brass strips *e* by the steel lining within said strips, which is powerfully magnetized by the poles *g*, this part of the steel lining being, in fact, a continuation of said poles. It is obvious that all the magnetic material will be collected between said brass strips, as they serve to prevent the rest of the lining from becoming magnetized, and consequently the attraction is entirely within the same. When the launder becomes choked through the accumulation of the captured material, the lower part of the arm *l* will be raised and the upper part will be held against the standard *s*, thereby closing the circuit *v* and giving the alarm. The lower part of said arm through the operation of the hinge *m* and the spring *n* is capable of swinging up and down through a considerable arc without disturbing the contact of the plates *q* and *r*, and thereby allows large pieces of ore to pass through without causing the alarm to become intermittent.

Another form of apparatus embodying the invention is shown in Fig. 4. The launder is indicated at A, the electromagnet at B, a bell-alarm at C, and a light-alarm at D. Pivoted on a frame E is an arm F, having its lower part hinged at G. A spring H and a narrow strip I of any flexible metallic substance serve to hold the lower part of the arm normally in alinement with the upper part and to permit it to move forward under pressure of the ore or material in the chute. Secured

to the lower part of the arm below the hinge is a sleeve J, in which a rod K, having an enlarged head L, is adjustable up or down and held in place by a thumb-screw M. The upper part of the arm is secured by a link N to the arm O of a lever P, and it may be insulated therefrom by means of a fiber piece Q. Said lever is pivoted at R, and on one end of the same a plunger S is adapted to make electrical contact with mercury and oil in a cup T. A weight U is provided on the other end of the lever to keep the plunger normally up out of the mercury. The current is represented diagrammatically as flowing from the source through the lever P to the mercury in the cup T, to the alarm, and back to the source.

I claim as my invention—

1. A magnetic separator comprising a chute, an electromagnet, an electric switch, and a swinging arm pivoted above said chute, its upper end being adapted to operate said switch and its lower end consisting of a separate piece hinged to said upper end and held normally in alinement therewith, said arm being so arranged that its lower end may be actuated by accumulating material whereby when the chute becomes choked the circuit is closed to give an alarm, said alarm being absolutely continuous and without intermittence, substantially as set forth.

ated by accumulating material whereby when the chute becomes choked the circuit is closed to give an alarm, said alarm being absolutely continuous and without intermittence, substantially as set forth.

2. A magnetic separator comprising a chute, an electromagnet, an electric switch, a swinging arm pivoted above said chute, the upper end of which is adapted to operate said switch and the lower end of which consists of a separate piece hinged to said upper end, and a spring to hold said lower end normally in alinement with said upper end, said arm being so arranged that its lower end may be actuated by accumulating material whereby when the chute becomes choked the circuit is closed to give an alarm, said alarm being absolutely continuous and without intermittence, substantially as set forth.

This specification signed and witnessed this 7th day of August, A. D. 1901.

JOHN KIRSCHWENG.

In presence of—

ROBERT BELL,
THOMPSON CAMPBELL.