(No Model.)

G. CONKLING.

FEEDING MECHANISM FOR MAGNETIC SEPARATORS.

No. 517,734. Patented Apr. 3, 1894.

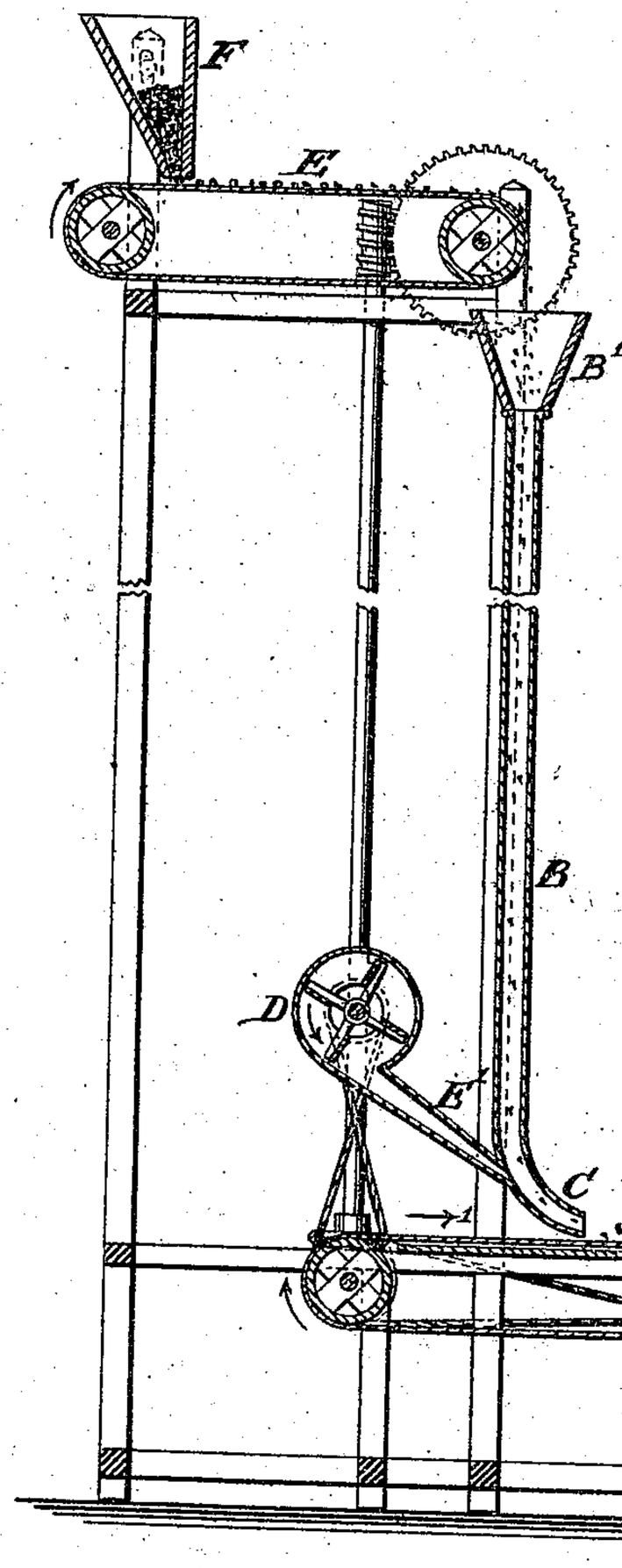


Fig. 1.

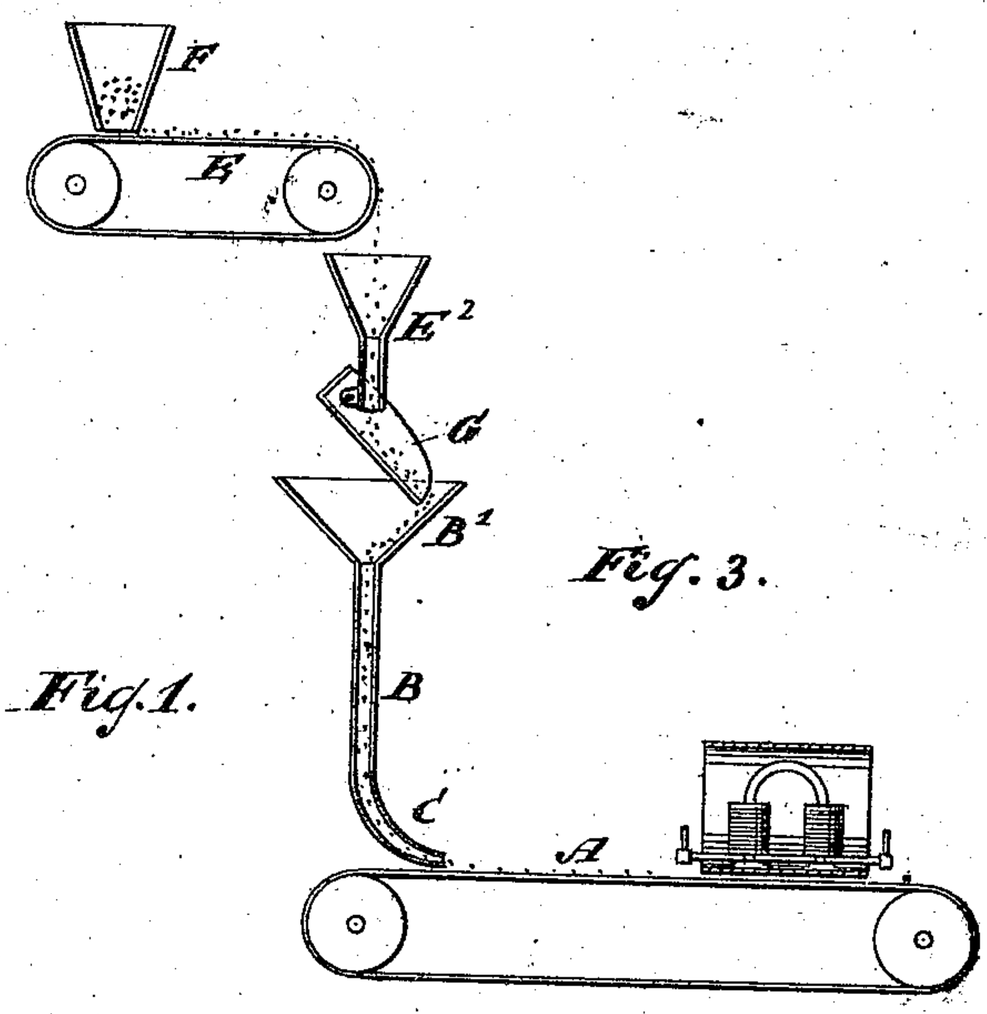
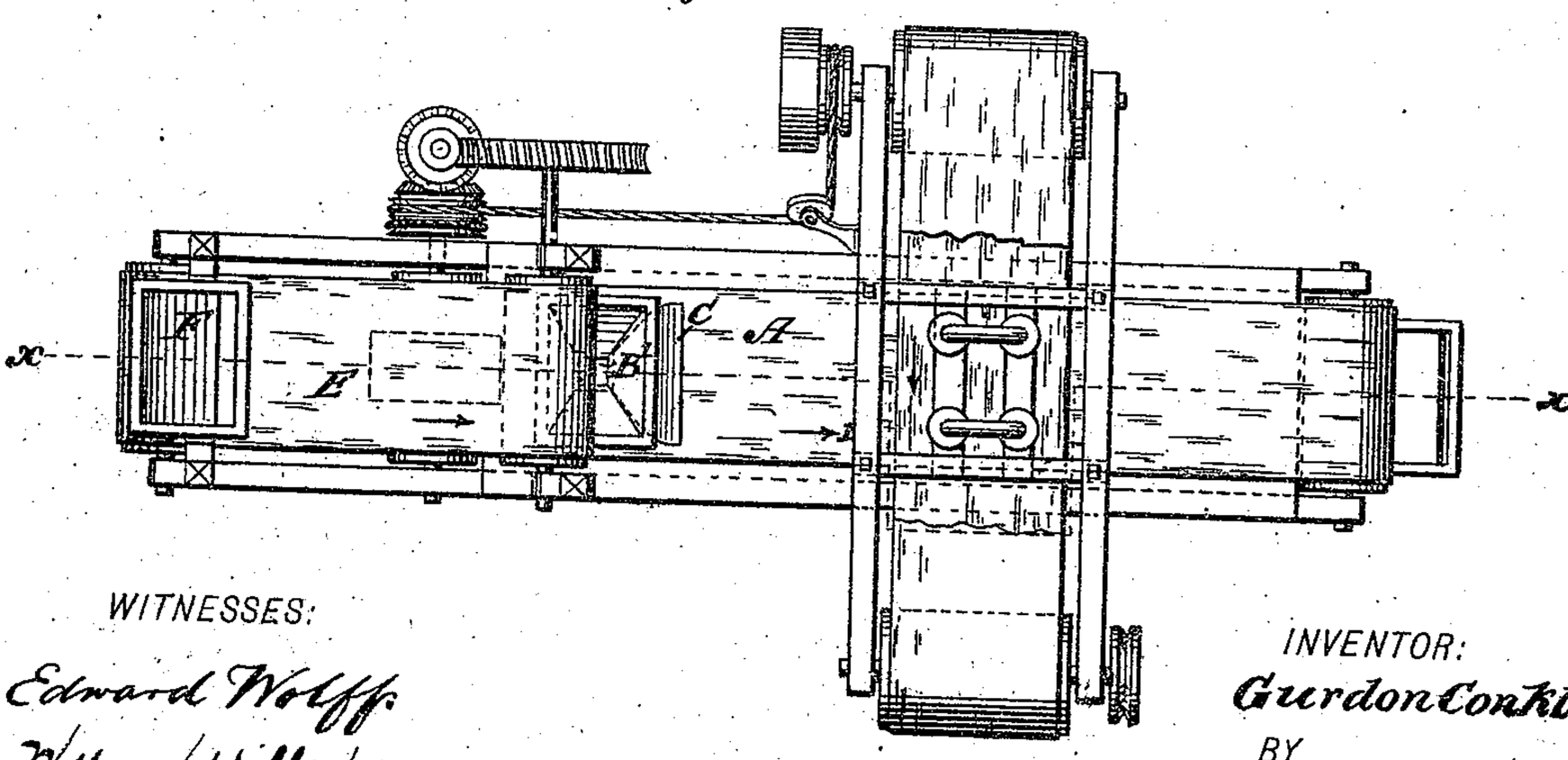


Fig. 3.

Fig. 2.



WITNESSES:

Edward Wolff.

William L. Miller

INVENTOR:

Gurdon Conkling.

BY

Van Santvoord & Hauff

his ATTORNEYS

UNITED STATES PATENT OFFICE.

GURDON CONKLING, OF GLENS FALLS, NEW YORK.

FEEDING MECHANISM FOR MAGNETIC SEPARATORS.

SPECIFICATION forming part of Letters Patent No. 517,734, dated April 3, 1894.

Application filed June 25, 1891. Serial No. 397,446. (No model.)

To all whom it may concern:

Be it known that I, GURDON CONKLING, a citizen of the United States, residing at Glens Falls, in the county of Warren and State of New York, have invented new and useful Improvements in Feeding Mechanism for Magnetic Separators, of which the following is a specification.

This invention relates to improvements in that class of devices known as magnetic ore separators, and more particularly to the feeding mechanism thereof, wherein the mass to be separated is fed upon a belt or conveyer which carries it through the magnetic field, said improvements being pointed out in the following specification and claims, and illustrated in the accompanying drawings, in which—

Figure 1 represents a vertical section of a magnetic separator of the type of that described in Letters Patent No. 383,863, granted to me June 5, 1888. Fig. 2 is a plan or top view. Fig. 3 is a symbolic representation of a stationary hopper discharging its contents through a vertical tube of prescribed length into an adjustable inclined trough from the lower end of which the crushed ore is discharged into the flaring mouth of a feed chute provided at the bottom with a curved nozzle terminating in suitable proximity to the feed belt of a magnetic separator.

In effecting the magnetic separation of iron particles from dry crushed ore by means of a belt which carries the crushed ore through the magnetic field, it is desirable that the crushed ore be thinly spread upon said belt. It hence follows that in order to enable the separator to deal with a large quantity of ore it is necessary that the carrying belt shall move with considerable velocity.

The object of the present invention is to facilitate the employment in a magnetic separator of a rapidly moving feed belt.

The invention consists in the combination with a magnetic separator employing a rapidly moving feed belt, of a delivering device embracing means for imparting to a thin stream or sheet of crushed ore a velocity of motion approximately in the direction of movement of the belt which is the same or nearly the same as the velocity of the belt. Under such conditions of delivery there will be no throwing off of the particles of crushed ore from the belt and no vibratory motions imparted to the belt tending to toss the ore lying upon its surface, as there would be if the crushed ore were permitted to fall upon the belt without having previously acquired a direction of motion the same as that of the belt and a velocity of motion approximately to that of the belt. Furthermore, the stream of crushed ore before it reaches the belt, is spread so that the ore when delivered upon the belt forms a thin layer of approximately uniform depth.

It will readily be perceived that there are a variety of ways in which the desired motion can be imparted to the crushed ore. It is essential that the flattened nozzle from which the crushed ore is discharged shall terminate in a plane parallel with and near the surface of the belt. The crushed ore may be fed into a chute with which such nozzle connects and may be driven out of the nozzle by a current of air of the required velocity furnished by a suitable blower. It will usually be preferred, however, to connect the nozzle with the lower end of a vertical chute or flattened tube, into the flaring upper end or mouth of which the crushed ore is fed and which is of sufficient height to enable the crushed ore in falling to acquire such rapidity of movement, that when deflected through the curved nozzle it will issue therefrom with substantially the same velocity as that of the belt. The velocity with which the crushed ore is delivered, when gravity is relied upon to give it its motion, may, if desired, be effectively regulated by making the instrumentality, which supplies ore to the chute vertically adjustable or by delivering the crushed ore into the flaring mouth of the feed chute from an inclined trough, into the upper part of which the crushed ore is fed from a prescribed elevation and by means of which the speed of motion of the crushed ore at the instant of its delivery into the feed chute, may be varied at will by varying the inclination of the said adjustable trough.

The part of the magnetic separator shown

in the drawings which it is material to herein consider, is the carrying belt A which is intended to be moved with great velocity in the direction of arrow 1 for the purpose of carrying through the magnetic field of the apparatus a thinly spread mass of crushed ore.

The devices for properly delivering the crushed ore embrace the curved nozzle C which is a flattened tube curved substantially as shown, so as to deliver its contents in a plane parallel with and in close proximity to the surface of the carrying belt A. The nozzle C is connected to the lower end of the upright feed chute B, the upper end of which is provided with a flaring mouth B′ into which the crushed ore is fed by any suitable means as for example by the slow moving feed belt E upon which a layer of crushed ore of considerable thickness is deposited from the hopper F. A blower D may if desired, be connected with the feed chute B, the spout E′ of the blower being in line with the nozzle C as shown in Fig. 1 for the purpose of forcing a current of air through the nozzle with such direction and such force as to drive the crushed ore out of the nozzle with the desired velocity. It will not be necessary to employ a blower when the conditions under which the apparatus is to be used, are such that the feed chute B may be made of such ascertained height that, the falling mass of crushed ore will have time to acquire the degree of velocity necessary to enable it to issue from the nozzle with the same, or nearly the same, speed as that of the belt. Thus for example, if the height of the surface of the slow moving belt E from which the ore falls be four feet above the curved nozzle, the falling ore will have acquired a velocity of sixteen feet per second before it strikes the curve of the nozzle. Assuming that its velocity is so far diminished by impact with the curved nozzle as to reduce it to a speed of say eight feet per second, it will then issue from the nozzle with a velocity the same as that of a carrying belt traveling at the rate of four hundred and eighty feet per minute, which is an entirely practicable speed for this belt. By impact with the curved nozzle the mass of ore descending through the feed chute B will be spread and delivered upon the carrying belt in a uniform layer, the thickness of which can be controlled by increasing or decreasing the speed of the feed belt E, or the quantity of crushed ore dropped into the flaring mouth B′ of the chute B. By increasing the height of the feed chute, the speed at which the crushed ore is delivered from the nozzle will be increased and vice versa, and the speed of the carrying belt must be changed accordingly. If it is desired from time to time to vary the velocity with which the crushed ore is delivered, an expedient similar to that symbolically represented in Fig. 3, may be employed. Thus a slow moving belt E or other instrumentality from which the ore is dropped, may be elevated above the nozzle, to a height which is more than sufficient to enable the falling ore to acquire the desired velocity. The stream of ore delivered from the elevated feed belt E will in this case fall through the short tube E^2 into the adjustable inclined trough G from the lower end of which it will be discharged into the flaring mouth B′ of the feed chute B.

It will be seen that a change in the inclination of the trough G will necessarily have the effect of changing the speed of motion acquired by the falling stream of ore prior to its entrance into the feed chute B, in falling down through which it will acquire additional velocity. In this device, if the crushed ore is delivered from the nozzle C at too great a velocity, the trough G will be tilted into a less steeply inclined position so as to reduce that velocity. Contrarily, if it be desired to increase the velocity with which the ore is delivered from the nozzle C, the trough G will be tilted into a more steeply inclined position, in which case the crushed ore will enter the feed chute B with a greater velocity of motion. Inasmuch as the speed of movement with which the crushed ore is delivered from the nozzle C, results in part from the velocity it acquires in falling through the chute B and in part from the velocity it possesses prior to its entrance into said chute, it will be perceived that the adjustable inclined trough G affords a convenient means of effectively varying the velocity with which the ore is delivered from the nozzle C as may be required in order to make that velocity substantially the same as the velocity of the carrying belt A.

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

1. In combination with a magnetic ore separator comprising the rapidly and slowly moving belts, one mounted above the other, mechanism substantially as described for operating said belts, of a chute conveying ore from one belt to the other, and a fan blower connected to and adapted to deliver a current of air into said chute whereby the velocity of the ore is increased, substantially as described.

2. The combination with an ore separator provided with rapidly and slowly moving belts one mounted above the other, of a chute B, having a bent nozzle C, at its delivery end, and a fan blower D, provided with an inclined spout E′ said spout being connected to the chute in a line with the nozzle C, whereby the air from the fan is directed in the nozzle, substantially as and for the purpose set forth.

3. In an ore separator, the combination with the belts A, E, one mounted above the other, mechanism, substantially as described, for driving said belts, of a vertical chute B intermediate of the belts and adapted to deliver ore from one to the other, a bent nozzle C on the discharge end of the chute, the bend of which is in the direction of the travel of

the belt, an air-blast connected to the chute in a line substantially straight with that of the delivery end thereof, and a connection with the mechanism driving the belt with that of the air-blast whereby the latter is driven therefrom, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

GURDON CONKLING.

Witnesses:
WM. C. HAUFF,
E. F. KASTENHUBER.