

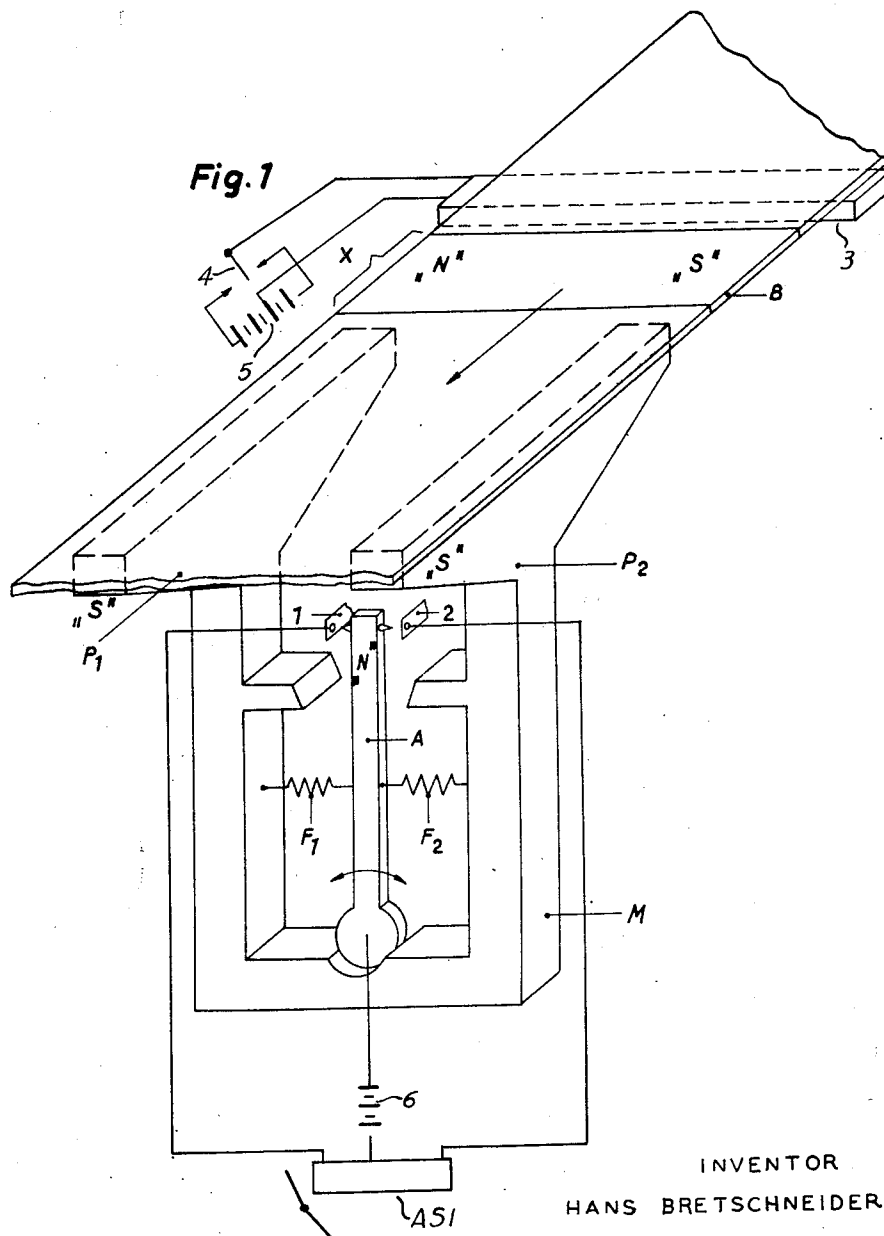
March 12, 1957

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ARRANGEMENT FOR USE IN CONVEYING PLANTS EMPLOYING
MAGNETIC DESTINATION CHARACTERISTICS

2,784,851

Filed Nov. 12, 1952

2 Sheets-Sheet 1



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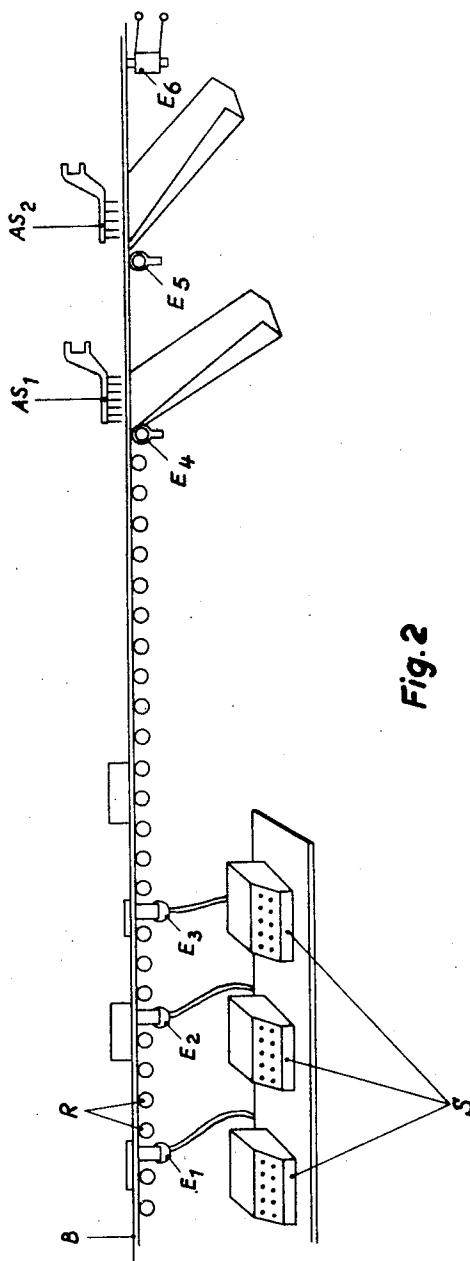


Fig. 2

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ARRANGEMENT FOR USE IN CONVEYING PLANTS EMPLOYING MAGNETIC DESTINATION CHARACTERISTICS

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6 Claims. (Cl. 214—11)

The invention relates to conveying systems used to distribute articles from a central station to any one of a plurality of receiving stations and to deliver to a predetermined one of said stations the conveyed articles automatically. To insure such automatic delivery, the articles to be conveyed are placed on definite sections of a belt conveyor, for instance, each such section having a destination characteristic for cooperation with a definite receiver or sorting station.

Destination characteristics of mechanical nature are known, such as studs mounted on the conveyor belt, or selector switches arranged to run in synchronism with the conveying plant. Also devices comprising magnetic destination characteristics have been proposed in a form in which a magnetization is impressed upon the conveying belt made of some magnetizable material, the magnetic impressions being produced with the aid of electromagnets at the time the articles are placed on the belt. When the sections so magnetized pass by the electromagnets, installed in the proximity of the receiving stations, the magnetic impression of the belt becomes effective to actuate the delivery device at the respective receiving station. To distinguish between the several destination characteristics, two impulses are each time impressed on the magnetizable belt. Furthermore, arrangements employing different combinations of impulses have been provided.

However, destination characteristics so combined are relatively difficult to render effective and require complicated devices to be provided for this purpose. In addition, the speed of the conveying belt must be low enough to provide for successful cooperation of the combination characteristics with the delivery mechanisms at the receiving stations.

The invention therefore provides for an arrangement that employs the least possible number of the elements concerned with the use of destination characteristics on the conveyor belt. To this end, each receiving station comprises what may be called a magnetic bridge-switch. By this switch, a magnetization, impressed by a central sorting or sending station to characterize the destination of the article conveyed, is detected in order to initiate the delivery of this article to the proper receiving station. Depending upon the polarity impressed on the magnetic belt, said bridge switch is able to assume a normal or at-rest position and two working positions and in this way to control two contacts. Accordingly, if several magnetizable bands, arranged to run in synchronism, are used, such as n bands, 3^n destination characteristics may be employed in respect of the delivery stations to be selected. The conveying belt, or the band running in synchronism therewith and carrying the destination characteristics, is finally demagnetized by alternating current. The rollers carrying the magnetizable bands should have a non-magnetic coating of sufficient thickness to prevent the magnetic impressions impressed upon the

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bands from being varied or influenced during transportation of the bands over the rollers.

The invention is explained hereafter more fully, reference being had to the accompanying drawings that show one embodiment thereof, in which:

Fig. 1 represents one of the magnetic bridge-switches arranged at the receiving stations to control the delivery mechanism thereat;

Fig. 2 is a diagrammatic elevation of a conveying plant as provided by the invention, and shows a sorting or sending station, two receiving stations, and a means that serves to efface the destination characteristics impressed on the steel belt.

As shown in Fig. 1, the magnetizable conveyor belt B, made of steel, is arranged to slide along a plurality of spaced pole pieces P1, P2 of a U-shaped magnet M, as indicated by the arrow. Magnet M may be either a permanent or an electromagnet. Between the arms thereof an armature A is rotatably mounted and is adapted to selectively cooperate with two contacts 1, 2. The armature A is a permanent magnet having its upper portion magnetically poled North, as shown.

Whenever belt B has a portion which has no magnetic impression thereon which moves along the pole pieces P1, P2, armature A remains in its neutral or at-rest position because its northerly portion is equally attracted to both south pole faces of magnet M, the springs F1 and F2 exerting equal and opposite lateral tension on the armature. Accordingly neither of the contacts 1, 2 is operated. As soon, however, as a belt section having a magnetic impression thereon reaches the pole pieces P1, P2, the magnetic bridge will be deprived of its equilibrium. The effect of this action depends upon the direction of the cross-magnetization produced by the exciting magnet, numeral 3, whose magnetic polarity may be controlled by a double-throw switch 4 adapted to selectively apply currents of opposite polarity from the source 5; the switch 4 being under control of the sorting or sending station. For example, if belt section X has been given a north-pole on the left-hand side by electromagnet 3, as viewed in the drawing, and a south-pole on the other side, then the magnetic flux will be increased in the right-hand part of the bridge but decreased in the left-hand part thereof, these two parts being south-magnetic. As a result, armature A is attracted toward the right so as to close the contact 2. Thus, when the magnetized belt section X has moved past the pole pieces P1, P2, the equilibrium of the magnetic bridge will be re-established by the tension of spring F1 and armature A will be restored to its normal open position, that is, to the mid-position shown. The circuit closed by contact 2 includes a potential source 6 serially connected between the armature A and the delivery device AS1. AS1 is a multi-position electromagnet deflecting device having two terminals each connected respectively to fixed contacts 1 and 2 whereby upon movement of the armature A to the right or the left, the device AS1 will assume different positions. The device AS1 is fixed with respect to the moving belt B but is adapted to selectively deflect objects therefrom.

As shown in Fig. 2, for simplicity of illustration a single belt B is carried over transportation rollers R. The central sorting or sending station S has keyboards and a corresponding number of magnets E1, E2, E3 energized selectively by depressing these keys on its associated keyboard. If conveyor traffic is light, one keyboard and magnet would suffice and if traffic is heavy, the extra keyboards are required. The magnets E1, E2, E3 respectively serve to impress upon the belt the magnetic destination characteristic desired in each case. E4 and E5 denote magnetic bridge switches that are constructed as shown in Fig. 1 and serve to render effective

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tive the delivery devices AS1, AS2 which are responsive to the destination characteristics impressed on belt B at points thereof located beneath the article being conveyed. AS1, AS2 designate the delivery devices controlled by the bridge switches E4, E5 at but two positions along the route of the belt, it being understood that a larger number of positions will be provided in any system; the showing herein being limited to but two positions for the sake of simplicity. In other words each magnet E1, E2 and E3 is capable of impressing a destination characteristic on a discrete portion of the same belt. For example, in Fig. 2 three articles are shown on the belt, directly above the magnets E1, E2 and E3 respectively, and each destined for a different station, only two of which are shown. Thus, the first receiving station may be adapted to receive articles on the belt related to a first destination characteristic, e. g., N—S, the second station may be adapted to receive articles related to characteristic S—N, and the third station will receive articles related to a neutral characteristic. At the end of the run of belt B, a magnet E6, controlled by alternating current of mains frequency, is arranged to erase the destination characteristics of the belt in order that upon re-passage before the magnets E1 . . . E3 new destination characteristics may be applied thereto representative of the destination of another of said articles. It will be clear that a plurality n , of belts B running in parallel and in synchronism may be utilized, each with its associated storage and reading apparatus, from which 3^n destination characteristics may be derived. The number of delivery stations may thereby be increased in accordance with the trinary permutation code.

I claim:

1. An automatic belt conveyor sorting system for sorting articles and distributing same, comprising an endless belt of magnetic material, a sorting station and a receiving station spaced therefrom and disposed along the route of travel of said belt, a delivery device associated with said receiving station adapted to deliver a predetermined one of said articles to said receiving station, means at said sorting station for producing in said belt any of three possible magnetic conditions, said conditions characteristic of said receiving station, detection means at said receiving station responsive to said conditions to control operation of said delivery device, whereby said

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article is selectively delivered by said device to said receiving station.

2. An automatic belt conveyor sorting system as claimed in claim 1, wherein said detection means comprises a magnet having a pair of U-shaped arms, a pivotally mounted armature centrally disposed between said arms, a pair of contacts cooperating with said armature, one of said contacts adapted to be operated when said armature is rotated in a first direction and the other of said contacts adapted to be operated when said armature is rotated in a second direction, and resilient means to normally maintain said armature in a neutral position between said arms.

3. An automatic belt conveyor system as claimed in claim 2, wherein said magnet further comprises a pair of spaced pole pieces attached to the ends of said arms and disposed in a position normal to the direction of movement of said belt.

4. An automatic belt conveyor system as claimed in claim 2, further comprising means to erase given of said magnetic conditions from said belt, said last named means disposed between said receiving station and said sorting station along the route of travel of said belt.

5. An automatic belt conveyor system as claimed in claim 2, wherein there is further provided a plurality of receiving stations, each having a detection means responsive to different predetermined of said magnetic conditions.

6. An automatic belt conveyor system as claimed in claim 2, wherein the means at said sorting station for producing predetermined magnetic conditions in said belt comprise a plurality of magnetic induction devices, each placed in a position normal to the direction of movement of said belt and adapted to selectively apply said magnetic conditions to different portions of said belt.

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