Aug. 4, 1925. 1,548,563

H. K. SPENCER

MEANS FOR HANDLING ARTICLES

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Fig. 1.

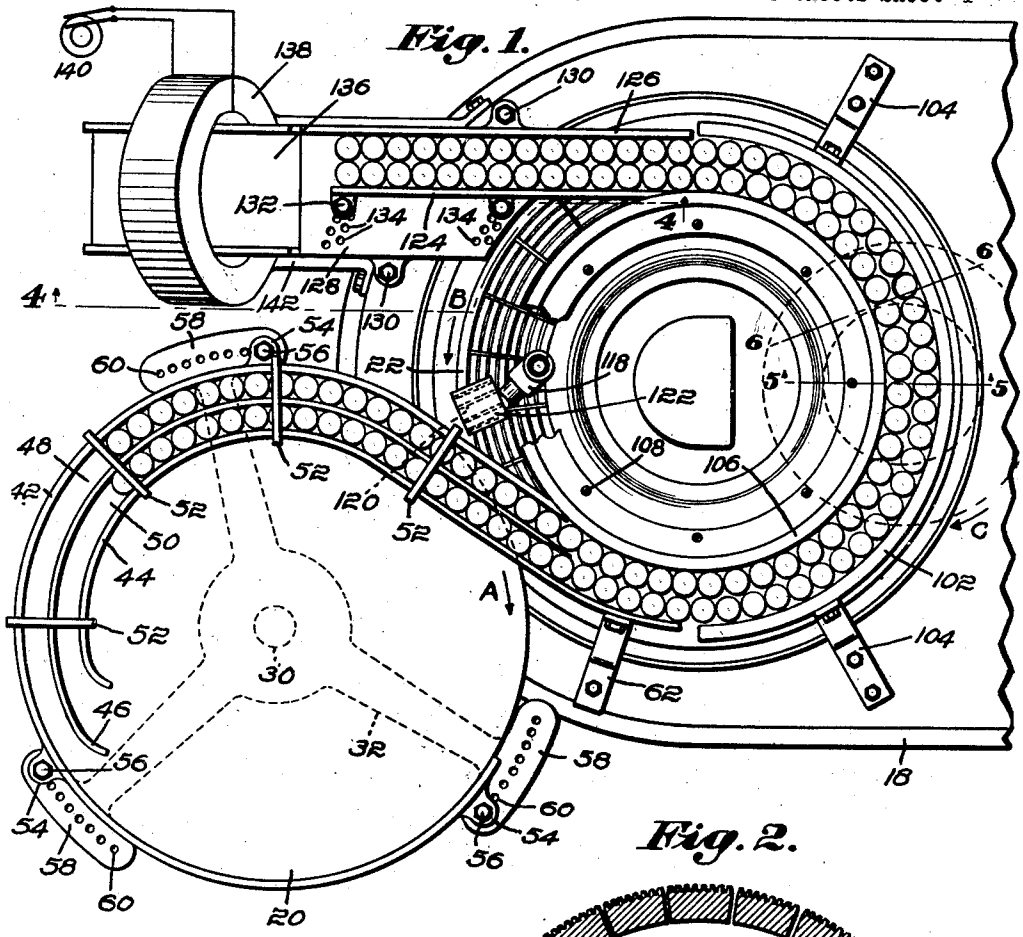
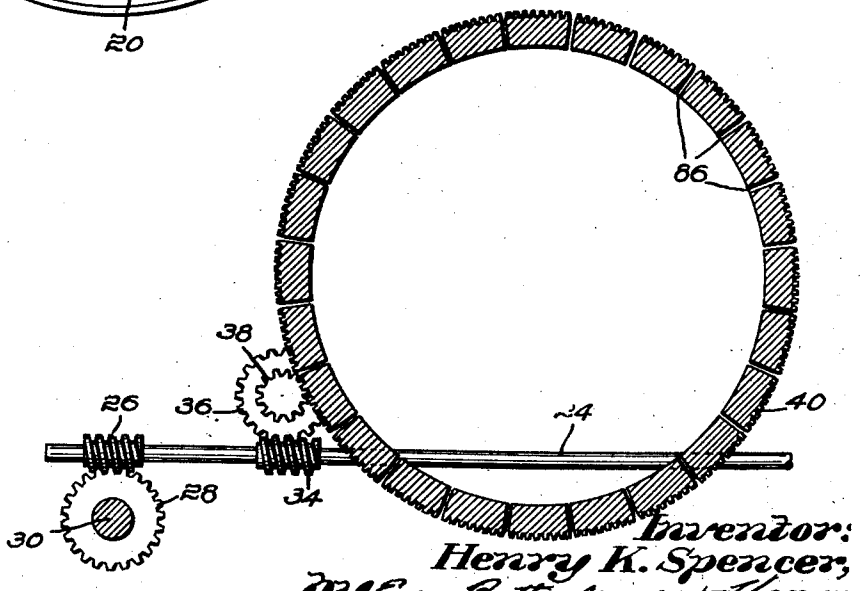


Fig. 2.



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Fig. 4.

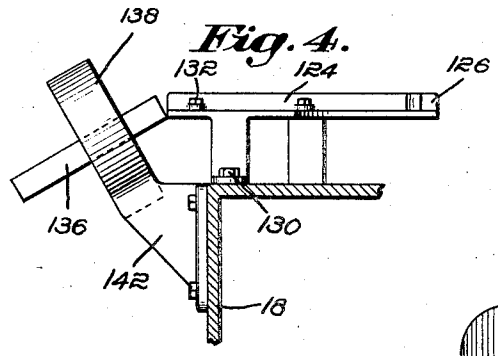
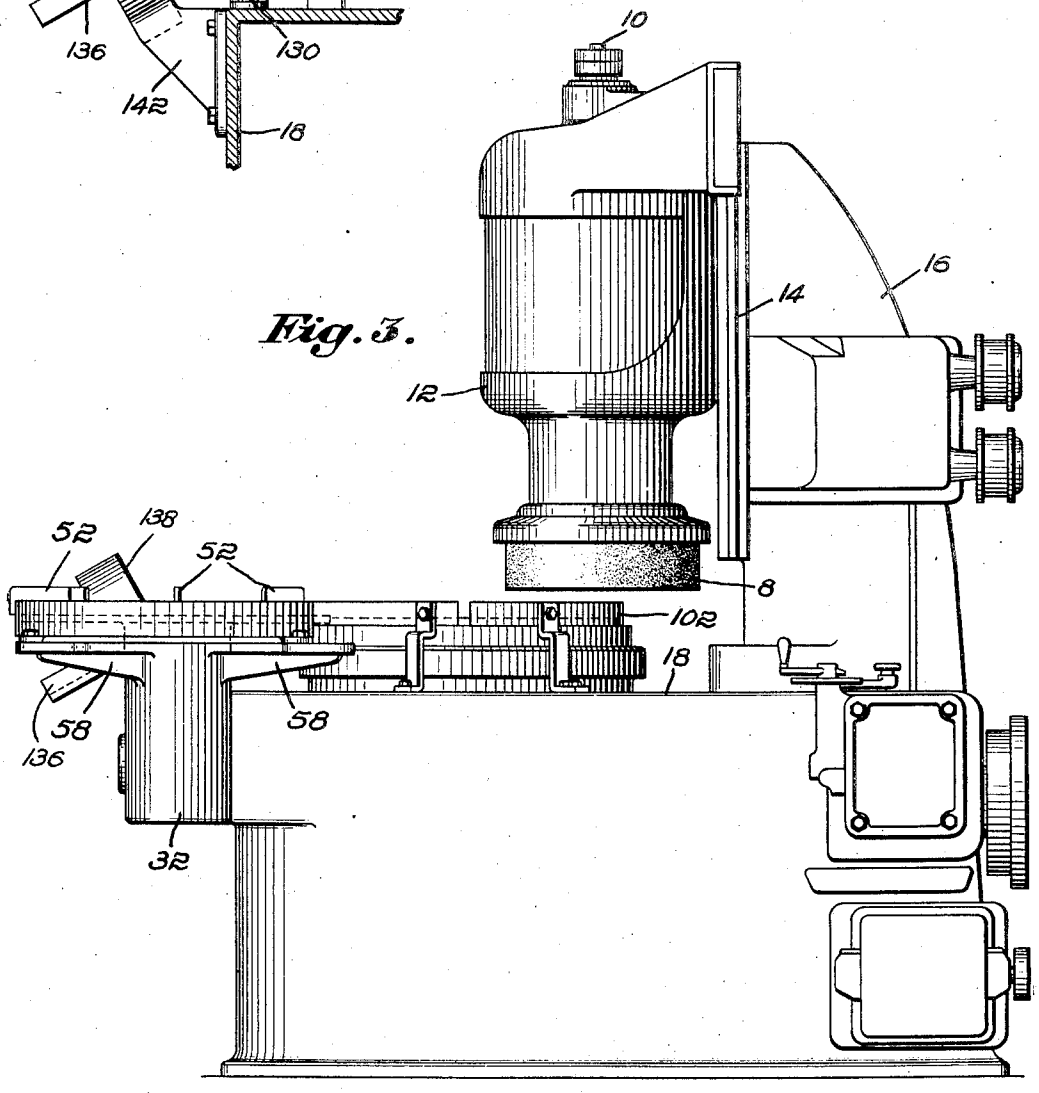


Fig. 3.



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Fig. 5.

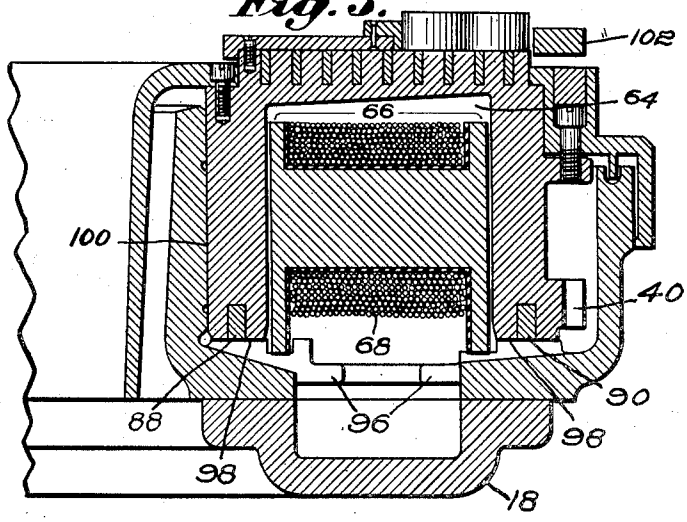


Fig. 6.

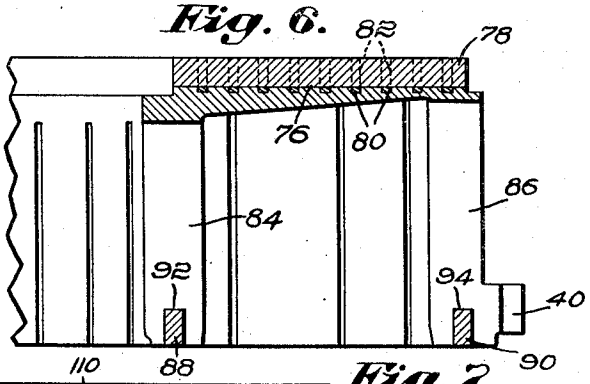
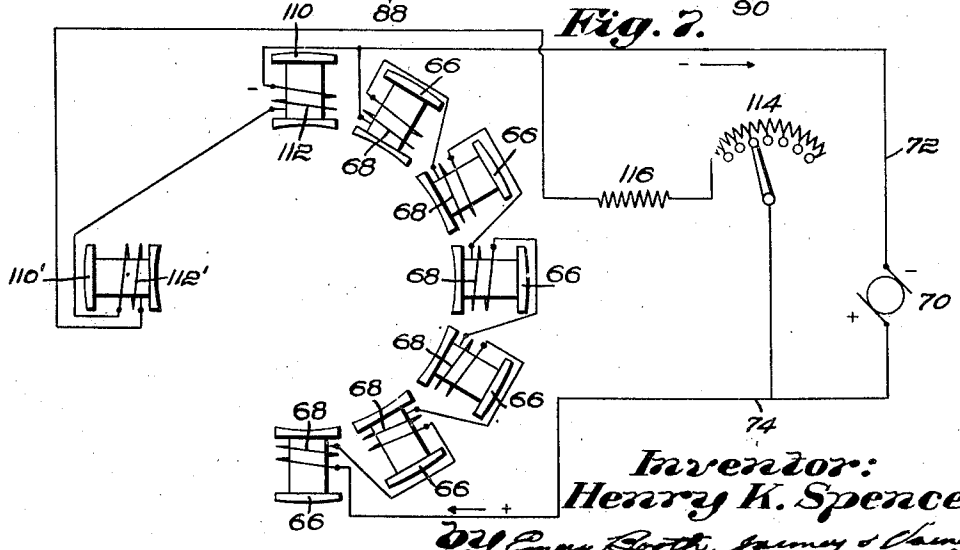


Fig. 7.



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Patented Aug. 4, 1925. 1,548,563

UNITED STATES PATENT OFFICE.

HENRY K. SPENCER, OF WATERTOWN, MASSACHUSETTS, ASSIGNOR TO THE BLANCHARD MACHINE COMPANY, OF CAMBRIDGE, MASSACHUSETTS, A CORPORATION OF MASSACHUSETTS.

MEANS FOR HANDLING ARTICLES.

Application filed October 6, 1922. Serial No. 592,740.

To all whom it may concern:

Be it known that I, HENRY K. SPENCER, a citizen of the United States, and a resident of Watertown, in the county of Middlesex and State of Massachusetts, have invented an Improvement in Means for Handling Articles, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

This invention relates to means for handling articles, and aims to provide a novel and improved method of and means for handling work pieces in connection with metal working machines, such as surface grinders.

The invention will be best understood by reference to the following description, when taken in connection with the accompanying drawings of one specific embodiment thereof, while its scope will be more particularly pointed out in the appended claims.

In the drawings:

Fig. 1 is a plan of a portion of the surface grinding machine exemplifying the invention;

Fig. 2 is a skeletonized plan, partly in section, of a portion of the driving mechanism of the machine;

Fig. 3 is a side elevation of the machine;

Fig. 4 is a detail, sectional view on line 4—4 of Fig. 1, illustrating a portion of the means for discharging and demagnetizing the work pieces after they have been operated upon;

Fig. 5 is a vertical sectional view on an enlarged scale on line 5—5 of Fig. 1;

Fig. 6 is a sectional view on an enlarged scale on line 6—6 of Fig. 1; and

Fig. 7 is a diagrammatic view of the electrical system.

Referring to the drawings, and to the embodiment of the invention which is selected for exemplification, there is shown (see Fig. 3) a metal working tool specifically a vertical surface grinder, whose general characteristics are similar to that which is the subject matter of U. S. Letters Patent No. 1,182,861, issued May 9, 1916, to which reference may be had for details not disclosed herein. The machine is provided with an annular grinding wheel 8, mounted on a vertical spindle 10 carried by a wheelhead 12, which is mounted to slide vertically on ways 14 presented by a column 16, the latter being supported by a base 18.

Referring now to Fig. 1, the machine is provided with two traveling conveyors, one delivering articles to the other. The articles to be operated on are placed on the first conveyor, and are carried thereby onto the second, which carries the articles past the work-performing means, and then to the point of discharge. In the present example, the conveyors are two disks 20 and 22, mounted to rotate about vertical axes, and having their work-supporting surfaces generally horizontal, and substantially in the same plane. In practice, it is desirable to have the surface of the first disk 20 very slightly higher than that of the second, thereby to avoid any possibility of the articles catching on the edge of the second disk in passing from one to the other. Herein, the disks are tangent to each other, with simply a slight working clearance between them.

Rotation of the disks may be accomplished by suitable mechanism, herein a driving shaft 24 (see Fig. 2), having thereon a worm 26 meshing with a worm gear 28, the latter being secured to an upright shaft 30, which is mounted in a bearing 32 (see Fig. 3), and carries at its upper end the disk 20. Referring again to Fig. 2, secured to the shaft 24 is another worm 34, which meshes with a worm gear 36, which is secured to a pinion 38, the latter meshing with a ring gear 40, which, as shown in Fig. 5, is formed as an integral part of the disk 22. The described gearing drives the disks in opposite direction, as indicated by the arrows A and B in Fig. 1. The direction of rotation of the grinding wheel is indicated by the arrow C.

The articles to be ground or otherwise operated on are deposited upon the disk 20, without regard to arrangement except that they should be placed in a general way near the circumference. Provision is made to utilize the rotation of the disk to arrange the articles in one or more rows, as by the use of one or more pairs of guides. In the present example, I have shown an outer guide 42, an inner guide 44, and an intermediate guide 46, forming two generally parallel concentric channels 48 and 50. The guides are suitably spaced to receive the articles between them, and are maintained

in properly spaced relationship by the use of several spacers 52. The outer guide 42 is preferably much longer than the others, and is provided with lugs 54 secured as by cap screws 56 to arms 58, which radiate from the bearing 32. Preferably, provision is made for adjustment of the guides about the vertical axis of the disk, as by providing each of the arms 58 with a series of holes 60 threaded to receive the cap-screws 56. By simply removing the cap-screws, the entire set of guides may be adjusted in a circumferential direction to take care of various conditions attending the delivery of articles from one disk onto the other, such as may be occasioned by differences in the size of the articles and the number of rows which are to be fed.

It is important to note that the linear speed of that part of the first disk with which the rows of articles contact should be slightly greater than the corresponding part of the second disk. As a result, in operation, the first disk is travelling slightly faster than the articles in either row, thereby causing the articles to be crowded against one another, thus maintaining compact rows. Of course, the slippage is greater on the outer row than on the inner one, due to the greater linear speed at the longer radius. Moreover, the outer row does not move onto the second disk quite so fast as the inner row, because the positions of the two rows are interchanged when they reach the second disk, that which was the outer row on the first disk becoming the inner row on the second. The first disk should be driven at a sufficiently greater speed than the second to cause all the rows of work to be urged forward, accompanied by a slight slipping of the disk with respect to each row. In this way, the articles in either row are crowded closely together, thus causing them to move onto the second disk with no gaps. The best results are secured by arranging the guides to extend a considerable distance on or along the second disk, as shown in Fig. 1. The inner guide 44 of the first disk becomes the outer guide, where it is associated with the second disk, and at this point, it is suitably secured to the base of the machine, as by a bracket 62.

As a means to hold the articles in place on the second disk, while they are being operated on, the latter in the present embodiment constitutes the body of a magnetic chuck. The chuck body presents an annular chamber 64 (see Fig. 5) for one or more, herein a series of magnets 66, having windings 68 (see Fig. 7) wound in the same direction, connected to each other in series, and receiving current from a suitable source 70, the terminals of which are connected to the coils by lead wires 72 and 74. The area of the chuck face served by these magnets is less than the total area, and herein is a zone of somewhat less than 180 degrees. To confine the magnetic flux to this zone, the chuck body is suitably slotted and grooved. In the present example, the face of the chuck body is provided with radial grooves 76 (see Fig. 6), which may be filled with non-magnetic strips 78 to exclude foreign matter therefrom. The face may be further provided with annular grooves 80, filled with non-magnetic rings 82 for a like purpose. These annular grooves divide the face of the chuck body into a multiplicity of small pole pieces, after the manner of the chuck which is the subject matter of U. S. Letters Patent No. 1,125,198, issued to me January 19th, 1915. The radial grooves intersect the annular ones, and are preferably shallower than the latter, the annular strips being notched to receive the radial strips, as should be evident from an examination of Fig. 6. The chuck body is further provided with two sets of radial slots 84 and 86, to assist in the localization of the magnetic zone; and, to strengthen the chuck body where it is cut away, I have provided inner and outer non-magnetic rings 88 and 90, received in annular grooves 92 and 94, respectively, provided in the chuck body.

While the chuck body is mounted to rotate, the magnets in the present example are fixed, and they are conveniently supported on a non-magnetic ring 96, on which horizontal bearings 98 and a vertical bearing 100 are formed. It should be evident from an inspection of Fig. 6 that there is comparatively little of the chuck body which presents a continuous annular connection between the segments formed by the described radial grooves and slots, so little, in fact, that the magnetic leakage from one to another is very slight. It is therefore apparent that the influence of the magnets will extend practically to only the chuck body segments with which they are associated. In other words, the magnetic zone is substantially confined to the area which is adjacent to the magnets. It should here be noted that the articles themselves may be magnetic pieces, or non-magnetic articles may be held to magnetic holders.

Work such as grinding, may be performed on the articles during their passage through the magnetic zone, and after the work is completed, the articles pass out of the magnetic zone into the non-magnetic zone, where they are released and can be removed by hand or by automatic means, such as that presently to be described.

Preferably, a guard 102 is provided adjacent the edge of the chuck body along the magnetic zone, to prevent the articles from being accidentally displaced, and from falling off the chuck face, if for any reason the current in the magnet circuit should be shut

off temporarily. This guard is suitably held in place by brackets 104, secured to the base 18. Preferably, also, there is provided an inner guard comprising a ring 106, suitably secured to the chuck face as by screws 108. In practice, the row of articles, or the inner row if there are two or more rows, actually engages this guard, and is guided thereby before the articles pass into the magnetic zone. This will be evident from an examination of the lower right-hand part of Fig. 1.

To insure prompt demagnetization and release of the work pieces, and to assist in confining the influence of the magnetizing coils to the desired area, there may be provided any suitable number of releasing magnets, herein a magnet 110 (see Fig. 7), having a winding 112, suitably connected in circuit with the source of current 70, there being provided a rheostat 114 in series with the magnet, for the purpose of varying the effectiveness of the latter. This is found desirable in practice, as large and small, and hard and soft pieces of work differ in the extent to which they become magnetized, and in the corresponding strength required of the releasing magnet to demagnetize or release them. I prefer to provide in addition to the rheostat a resistance coil 116, in series with the rheostat and the releasing magnet, as the use of this resistance permits the employment of a rheostat smaller in size than would otherwise be necessary.

To ensure the release of particles of magnetic material which might adhere to the face of the chuck, and thereby interfere with the accurate placing of subsequent pieces thereon, I prefer to provide a second releasing magnet 110′, having a winding 112′ located at a suitable point rearwardly of the magazine considered with reference to the movement of the chuck face. Removal of such particles from the chuck face may be accomplished by the use of appropriate cleaning means, herein a nozzle 118 (see Figs. 1 and 3), which discharges a cleansing fluid such as water through slots 120 provided in a scraper 122, which is disposed obliquely with reference to the path of the chuck face. Water supplied under pressure to this nozzle flushes the surface of the chuck body with sufficient force to carry away particles discharged by the scraper, and to carry them off the chuck face.

Removal of the articles from the chuck face may be accomplished automatically by the use of suitably arranged, fixed means, herein a guide 124, whose inner end is disposed adjacent the releasing magnet. Preferably, this guide is associated with a second guide 126, parallel therewith. Between these guides, there is a channel, into which the articles pass as they leave the chuck face. These guides are supported as by a bracket 128, secured to the base of the machine by screws 130. The guide 124 is secured to this bracket as by screws 132. To accommodate articles of various sizes, the guide 124 is adjustably fixed to the bracket, as by the provision of threaded holes 134, which in the present example are arranged in staggered relation in two rows, thereby to provide a finer adjustment than would be possible with a single row.

The articles having thus been removed from the chuck face are propelled end to end along and between the described guides and thence onto a downwardly inclined chute 136, which may direct the articles into an appropriate receptacle, not shown. If the nature of the work pieces is such that they are not completely demagnetized by the releasing magnet at the point of removal from the chuck, it is desirable to provide further demagnetizing means, such as a coil 138, encircling the chute 136, and connected in circuit with a source of alternating current 140. The coil may be supported on the base of the machine, as by a bracket 142.

The general operation and advantages of the machine should be evident from the foregoing, without further description.

Having thus described one embodiment of the invention, but without limiting myself thereto, what I claim and desire by Letters Patent to secure is:

1. In a machine of the class described, the combination of a movable work-support, means for conveying work pieces onto said work-support, electro-magnetic means for producing a local magnetic field to hold the work pieces on said support said means having provision to cause the work pieces to be held when the work support is in one position and to be released when said work-support is in another position, means for performing work on the work pieces when so held, and means for causing the work pieces to be discharged from said work-support.

2. In a machine of the class described, the combination of two conveyors, one delivering work-pieces to the other, electro-magnetic means for producing a local magnetic field to hold the work-pieces on the second conveyor, said means having provision to cause the work-pieces to be held when in a certain zone and to be released after passing through said zone, and means for performing work on the work pieces when so held.

3. In a machine of the class described, the combination of two rotatable disks having generally horizontal, work-supporting surfaces mechanism for rotating said disks, one in a direction opposite to that of the

other, means for causing work pieces carried by the first disk to pass therefrom onto the second disk, and means associated with the second disk to cause the work pieces to be held thereon when in a certain zone and to be released after passing through said zone.

4. In a work-handling apparatus, the combination of two conveyors, one delivering magnetic articles to the other, electromagnetic means for producing a local field to hold the magnetic articles on the second conveyor, said means having provision to cause the articles to be held when in a certain zone and to be released after passing through said zone, and means for demagnetizing said articles after being released.

5. In a machine of the class described, the combination of two rotary, travelling conveyors, each comprising a disk having a generally horizontal, work-supporting surface upon which articles are adapted to rest by gravity, means for causing rotation of said disks, one in a direction opposite to that of the other to propel the articles by friction from one disk to the other, guiding means fixed relatively to said disks to guide articles from one disk onto the other and off the latter, means to cause the articles to be held on the second disk magnetically, and means for performing work on said articles when so held.

6. In a machine of the class described, the combination of two rotary, travelling conveyors, each comprising a disk having a generally horizontal, work-supporting surface, means for causing rotation of said disks, one in a direction opposite to that of the other, guiding means to guide articles from one disk onto the other and off the latter, means providing for adjustment of said guiding means to receive articles of different sizes, means to cause the articles to be held on the second disk magnetically, and means for performing work on said articles when so held.

7. In a machine of the class described, the combination of a travelling support for a series of articles, means for performing work on the articles while they are being carried by said support, electromagnetic means for causing the articles to be held on said support during the performance of the work and subsequently released, and means for utilizing the forward movement of said support and the articles thereon to cause removal of the latter in a direction generally parallel to the plane of said work support following completion of the work.

8. In a machine of the class described, the combination of a rotative support for a series of articles, electro-magnetic means for producing a local magnetic field to hold said articles on said support, said means having provision to cause the articles to be held when in a certain zone and to be released after passing through said zone, means for performing work on the articles while they are being carried by said support, and means for utilizing the forward movement of said support and the articles thereon to cause removal of the latter in an outward direction considered with reference to the center of rotation of said support, following completion of the work.

9. In a machine of the class described, the combination of a rotative support for a series of articles, electro-magnetic means for producing a local magnetic field to hold said articles on said support, said means having provision to cause the articles to be held when in a certain zone and to be released after passing through said zone, means for performing work on the articles while they are being carried by said support, and an outwardly directed guide for utilizing the forward movement of said support and the articles thereon to cause removal of the latter in a generally outward direction considered with reference to the center of rotation of said support, following completion of the work.

10. In a machine of the class described, the combination of a support for articles, electro-magnetic means for producing a local magnetic field to hold the articles on said support, said means having provision to cause the articles to be held when in a certain zone and to be released after passing through said zone, means for causing the articles to be loaded onto said support, means for causing the articles to be carried through said zone while supported by said support, means for performing work on the articles while in said zone, and means for causing the articles to be unloaded from said support following completion of the work.

11. In a machine of the class described, the combination of a movable support for carrying magnetic articles, electro-magnetic means for producing a magnetic field to attract the articles thereby to hold them on said support, means for performing work on the articles while thus held, and demagnetizing means to which the articles are moved by said support after the work has been performed.

12. In a machine of the class described, the combination of a support for magnetic articles, electro-magnetic means for producing a magnetic field to hold the articles on said support, means for performing work on the articles while thus held, a coil through which the articles pass following completion of the work, and means for causing the energization of said coil by alternating current.

In testimony whereof, I have signed my name to this specification.

HENRY K. SPENCER.