June 19, 1956 A. G. SANGSTER 2,750,716

MAGNETIC WORK TRANSFER DEVICE

Filed June 26, 1952 3 Sheets-Sheet 1

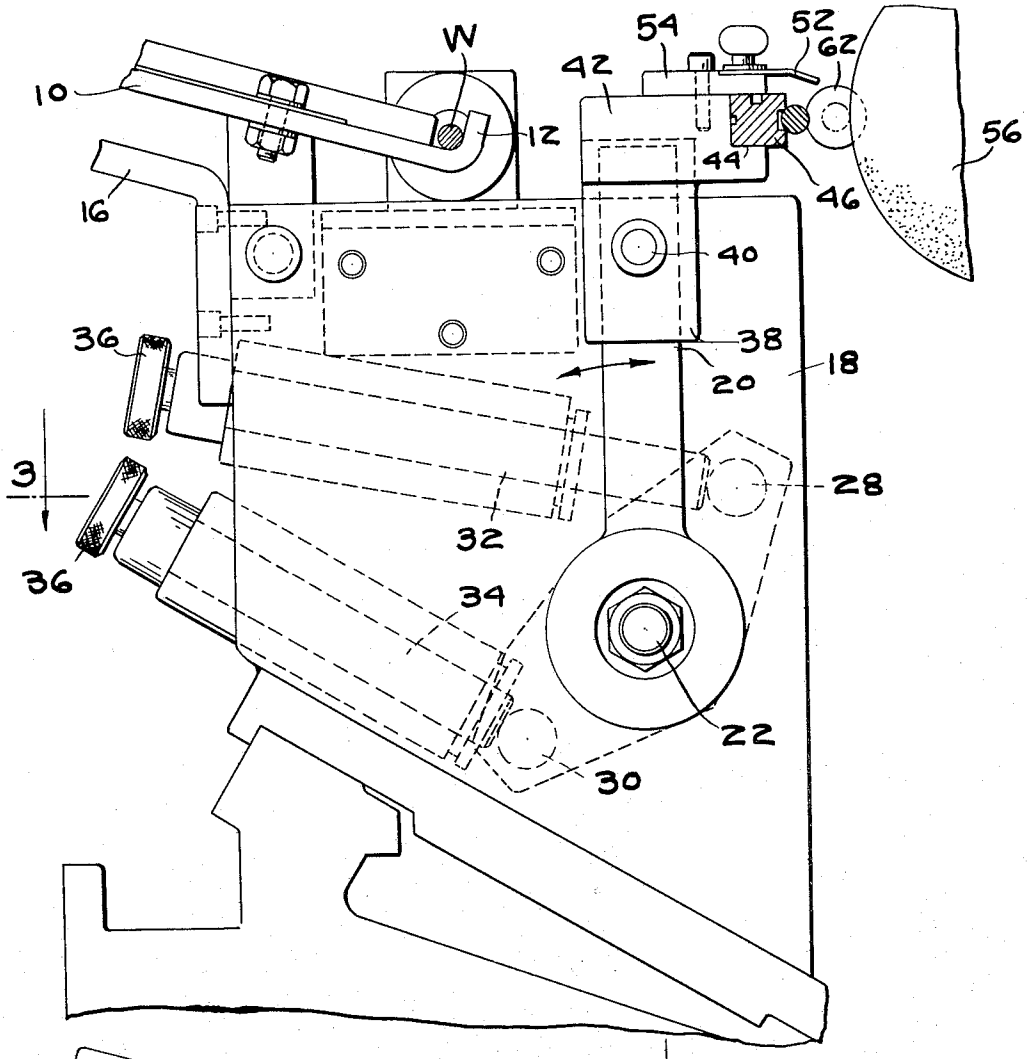


FIG. 1

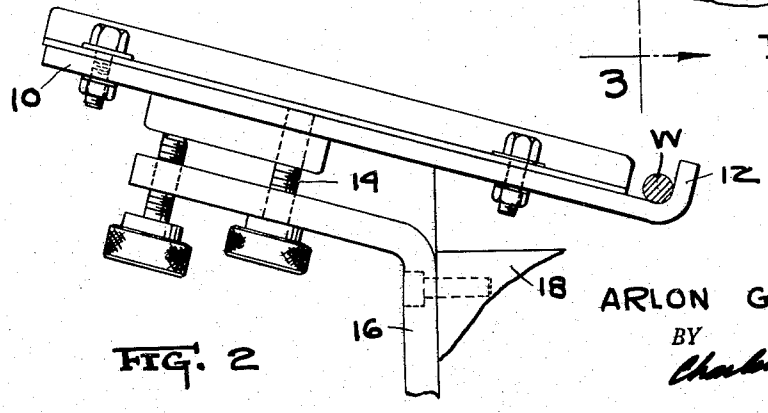


FIG. 2

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June 19, 1956 A. G. SANGSTER 2,750,716

MAGNETIC WORK TRANSFER DEVICE

Filed June 26, 1952 3 Sheets-Sheet 2

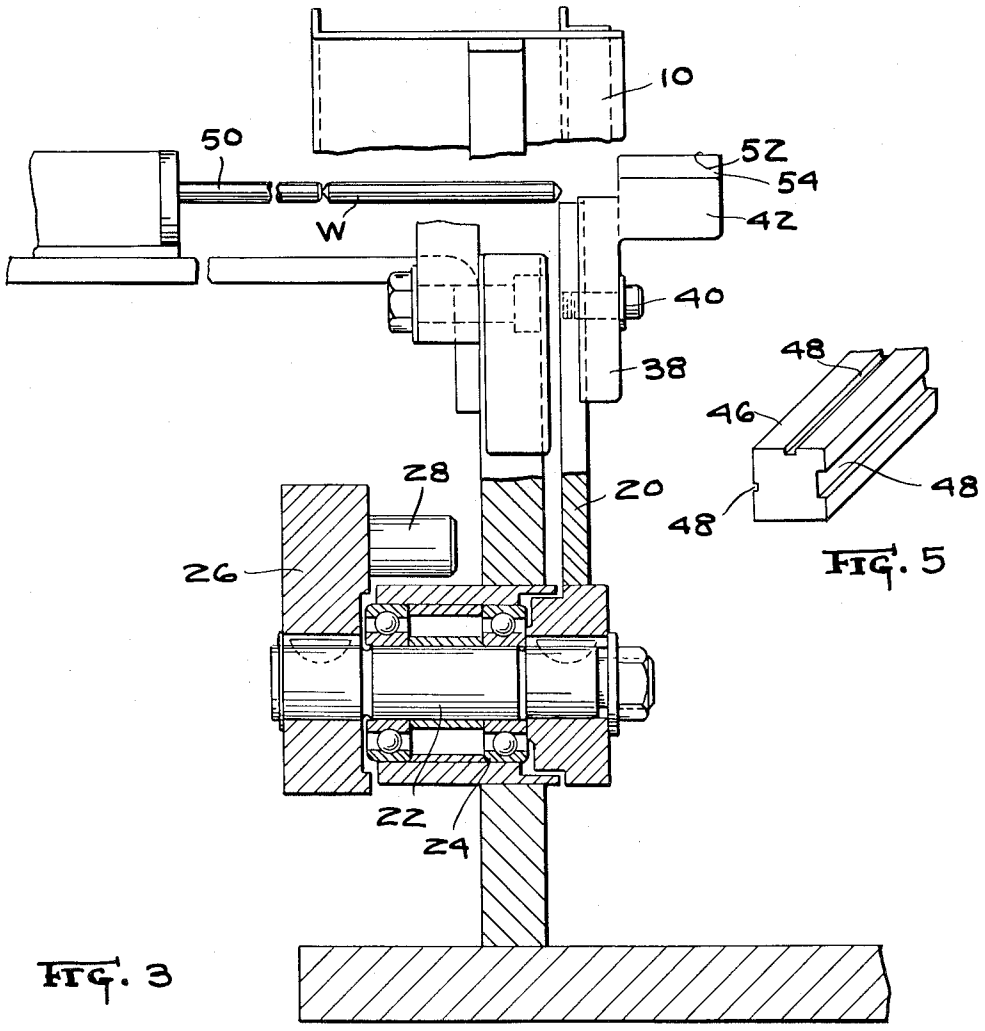


FIG. 3

FIG. 5

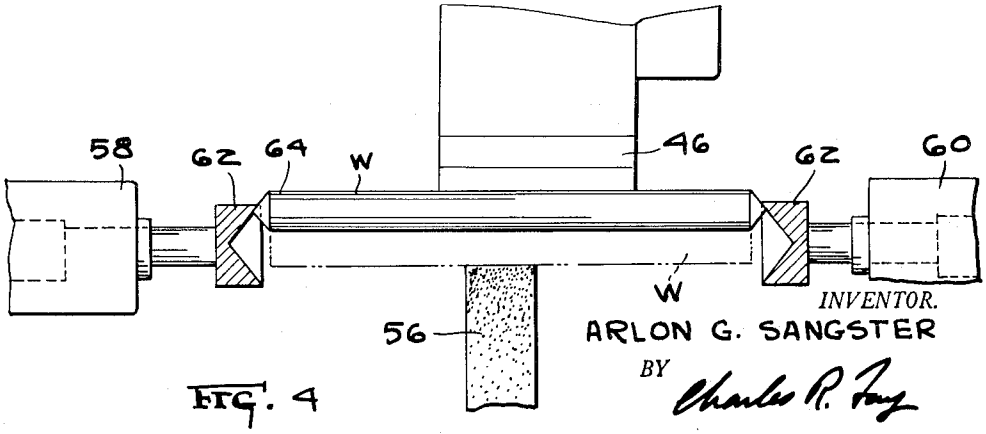


FIG. 4

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MAGNETIC WORK TRANSFER DEVICE

Filed June 26, 1952 3 Sheets-Sheet 3

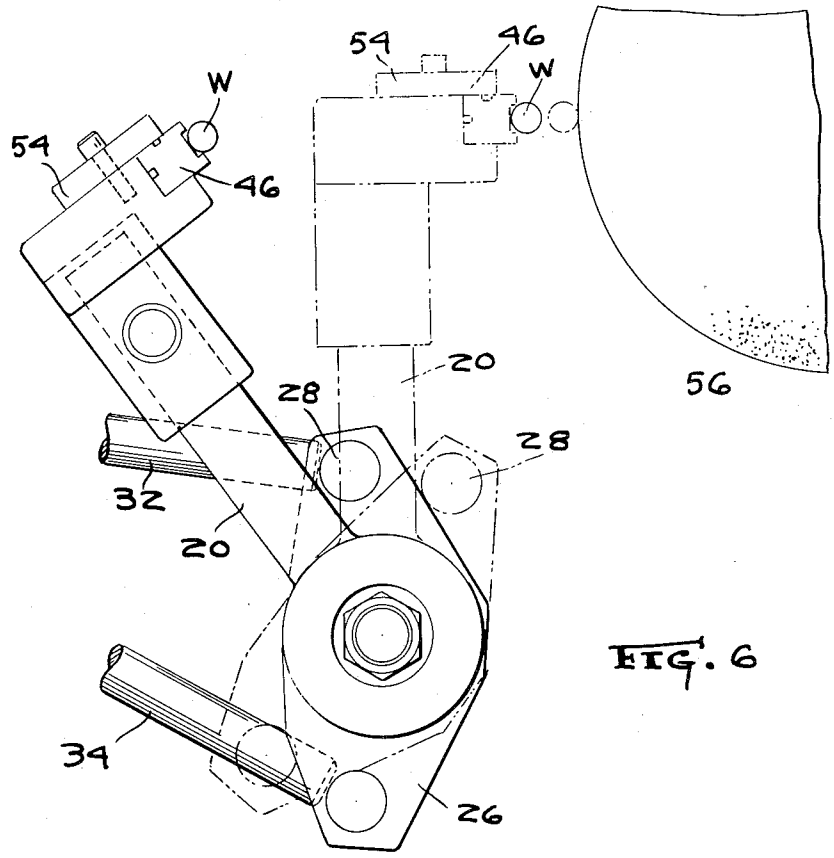


FIG. 6

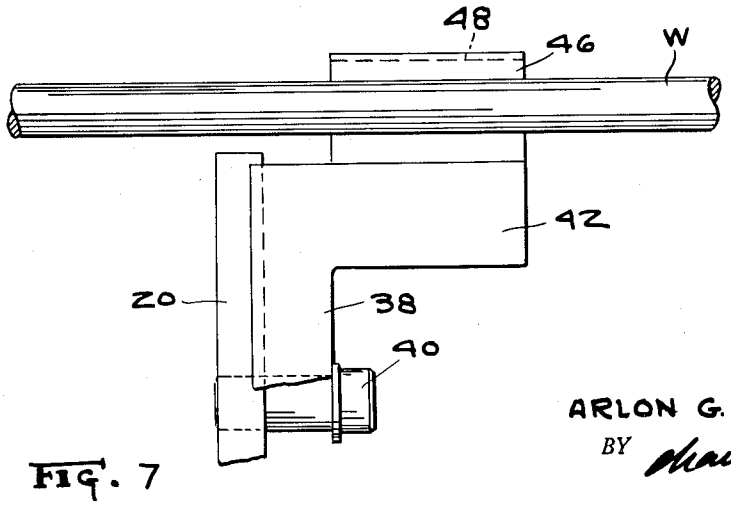


FIG. 7

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MAGNETIC WORK TRANSFER DEVICE

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Application June 26, 1952, Serial No. 295,744

10 Claims. (Cl. 51—105)

This invention relates to a magnetic transfer device for receiving magnetically permeable articles to be operated upon as by grinding, etc., from a hopper, and presenting the articles to a head or holder for holding the same while being operated upon; and the principal object of the invention resides in the provision of a device of the class described including a new and improved work transfer magnet which is movable from a hopper where the articles are picked up one-by-one, to a discharge position where a head is operated to strip the work-pieces from the magnet so as to present them to a tool to operate upon the same, such tool being a grinding wheel, etc., the device acting smoothly without any marring of the work-piece.

Other objects of the invention include the provision of a transfer mechanism including a magnet mounted upon an arm and movable from the pick-up station of a hopper for work-pieces to another station where the work-pieces are stripped from the magnet for presentation to an operating tool such as a grinding wheel, such magnet having a plurality of faces, each of which is provided with a recess or groove for holding work-pieces of different size, the magnet being easily turned on the arm to present the selected face for operation as desired, and said magnet being polarized longitudinally thereof so that work-pieces of different diameters are firmly held during transfer and are easily accommodated by the same magnet and in the same machine.

Another object of the invention includes a new and improved stripping mechanism including a pair of heads arranged to move coaxially and having conical facing surfaces that advance, contact the work-pieces held by the magnet, the apices of the conical faces being aligned and offset relative to the axis of the work-pieces in a direction away from the magnet, whereby the conical faces act to engage and strip the work-pieces from the magnet to present the same to the tool out of the effective range of the magnet.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings, in which:

Fig. 1 is a view in side elevation of a device according to the invention, parts being in section;

Fig. 2 is a view in side elevation of the hopper;

Fig. 3 is a section on line 3—3 of Fig. 1, showing the magnet in rear elevation;

Fig. 4 is a plan view on an enlarged scale, showing the stripper heads relative to the magnet and the work-piece;

Fig. 5 is a perspective view of the magnet;

Fig. 6 is an enlarged view illustrating the path of travel of the magnet on its transferring means; and

Fig. 7 is an enlarged view in front elevation of the magnet with the work-piece held thereto.

As shown in Fig. 1, there is provided an inclined hopper generally indicated at 10. This hopper has an adjustable stop 12, and because the hopper is inclined, the work-pieces *w* progress down the incline seriatim and

come to rest on the stop. The hopper may be adjusted for accurately positioning work-pieces of different diameters by conventional means, such as a thumb-screw 14 mounting the hopper on a bracket 16, the bracket in turn being mounted on the machine frame 18.

An arm 20 is pivotally mounted on a pin generally indicated at 22 and most clearly shown in Fig. 3, being mounted in bearings 24 and having keyed thereto a beam or crank 26 which is provided with a pair of large pins 28 and 30. These pins operate to oscillate arm 20 as indicated in Fig. 6 by means of a pair of rams 32 and 34 respectively, which are alternately operated by automatic valve means in sequence so as to move the pins 28 and 30 as will be clear to thus oscillate the arm 20. The range of travel of the rams may be adjusted by thumb-screws 36 to adjust the travel of the arm 20 according to requirements presented by work-pieces of different diameter.

The arm 20 is provided at its upper end with an adjustable slide 38 adjustably secured thereto by a fastener 40. This slide at its upper end is provided with a transversely extending holder 42, the forward face of which is provided with a cut-out portion or recess at 44, and this cut-out portion receives the magnet generally indicated at 46.

The magnet itself is best shown in Fig. 5 and comprises a solid rectangular member having a plurality of faces, each of which is longitudinally grooved as indicated at 48. Each groove is of a different size, both as to width and depth, and is made to accommodate the work-piece *w* substantially as shown in Fig. 1. The magnet is polarized longitudinally thereof, and thus will hold any magnetic member. The groove is of course required in order to center the work-piece so that each work-piece will be magnetically held in exactly the same position relating to the holding face of the magnet and the stripper to be described.

The hopper is provided with a ram generally indicated at 50 which operates in timed sequence to those at 32 and 34, and acts to project work-pieces *w* one-by-one from the hopper at stop 12 longitudinally outwardly so as to be positioned on the magnet in a central location thereon as will be clear. This operation of course occurs when the arm 20 is at its loading station indicated in full lines in Fig. 6, i. e., when the operative magnet groove 48 is aligned with the work-piece resting against the stop 12.

A guard 52 is secured to a block 54 adjustably mounted on the head 42 and this guard covers the work-piece *w* accurately to protect it against descending coolants. The adjustment is to guard the work-piece and the magnet against iron filings and chips and is adjustable so that it will accurately cover work-pieces or magnets of different size.

When the arm 20 has been oscillated toward the right to the position shown in Fig. 1 and in dotted lines in Fig. 6, the work-piece *w* is stripped from the magnet and is moved laterally therefrom out of the effective range thereof and into operative relation with the grinding wheel or other tool which is generally indicated at 56. The mechanism designed for this purpose comprises a pair of rams 58 and 60 which are opposed. These rams operate in unison and each is provided with a conical head 62. These heads face each other as shown in Fig. 4 and when they come together, engage the ends 64 of the work-pieces *w* and act somewhat in the nature of cams to slide the work-pieces in a direction away from the magnet toward the wheel 52, thus forcing the stripping of the work-pieces off the magnet and into the working area. The heads of course will be rotated if desired, if this is called for by the operation at hand.

This action is represented in both Figs. 1 and 6 where the work-piece is shown bodily moved from the magnet into the working area of the tool 56. The rams 58, 60

operate in timed relation to the other three rams in order to provide for faster serial operation for each work-piece, and as soon as the heads 62 retract to release the work-piece to a discharge chute or the like, the following work-piece is ready in position to be stripped off the magnet and operated upon as described.

It will be seen that this invention provides a magnetic work transfer device which is quickly and easily operated for work-pieces of different size, and which being completely magnetic will not injure the work-pieces in any way as often happens with mechanical clamps.

I claim:

1. Transfer mechanism comprising a source for supplying elongated magnetic articles, a movable arm, means to move the arm between the source and a delivery station for the articles, and a source of magnetic flux on the arm in position to receive the articles and secure the same thereto by magnetic lines of force and deliver the articles to the station, said flux source comprising a magnet having a plurality of faces each having an elongated article receiving surface slot of a different width, means holding the articles parallel to the magnet and to the slots, and the magnet being selectively rotatably movable to present any selected slot to the articles.

2. Transfer mechanism comprising a hopper for magnetic articles of elongated form, an arm movable from the hopper to a delivery station, an elongated magnet on the arm, means for depositing the articles on the magnet for transfer from the hopper to the delivery station, and means to strip the articles from the magnet at the delivery station, means to reciprocate the stripping means to engage the articles at the ends thereof, and means on the stripping means to shift the articles transversely away from the magnet as the stripping means engage the article.

3. The transfer mechanism of claim 2 wherein the article shifting means comprises a pair of facing concave heads.

4. Transfer mechanism for moving magnetic elongated articles transversely to a delivery station comprising a hopper for the articles, a magnet, means to move the magnet from the hopper to the delivery station along a predetermined path at right angles to the lengths of the articles, a pair of heads, means to reciprocate the heads toward and from each other on a line normal to the path of transverse motions of the articles, and of the magnet moving means, to engage the articles at the ends thereof, and means on the heads to strip the article from the magnet.

5. Transfer mechanism for magnetic elongated articles comprising a hopper for the articles, a magnet, means to move the magnet from the hopper to a delivery station along a predetermined path, a pair of heads, means to reciprocate the heads toward and from each other on a line at right angles to the path of travel of the articles and the magnet at the delivery station to engage the articles at the ends thereof, and means on the heads to strip the articles from the magnet in a direction parallel to the path of the article, the entire articles being removed bodily.

6. Transfer mechanism for magnetic elongated articles comprising a hopper for the articles, a magnet, means to move the magnet from the hopper to a delivery station along a predetermined path, a pair of heads, means to reciprocate the heads toward and from each other on a line normal to the path of travel of the article held by the magnet at the delivery station to engage the article at the ends thereof, and means on the heads to strip the article from the magnet in a direction parallel to the path of the article, said article stripping means comprising facing, aligned, concave recesses in the heads,

said recesses having a common axis spaced from the axis of the article on the magnet and having edges overlapping the article ends.

7. A grinding machine comprising a hopper, a movable arm, a grinding wheel, means to move the arm between the hopper and a delivery station for presentation to the grinding wheel, a magnet on the arm in position to receive an article from the hopper and hold the same by magnetic lines of force to present the article to the delivery station, means adapted to impinge the article and to bodily strip the same from the magnet, said stripping means also being adapted for moving the article from the magnet to the grinding wheel for the grinding operation on the article.

8. A grinding machine comprising a hopper, a movable arm, a grinding wheel, means to move the arm between the hopper and a delivery station for presentation to the grinding wheel, a magnet on the arm in position to receive an article from the hopper and hold the same by magnetic lines of force to present the article to the delivery station, means adapted to impinge the article and to strip the same from the magnet, said means also being adapted for moving the article laterally to the grinding wheel for the grinding operation on the article, said article impinging and stripping means comprising a pair of conical heads and means to move the same to approach the ends of the article at the delivery station and center the article in the heads.

9. A grinding machine comprising a hopper, a movable arm, a grinding wheel, means to move the arm between the hopper and a delivery station for presentation to the grinding wheel, a magnet on the arm in position to receive an article from the hopper and hold the same by magnetic lines of force to present the article to the delivery station, means adapted to impinge the article and to strip the same from the magnet, said means also being adapted for moving the article laterally to the grinding wheel for the grinding operation on the article, said article impinging and stripping means comprising a pair of conical heads and means to cause the heads to approach the ends of the article at the delivery station and center the article in the heads while stripping the article from the magnet, the apices of the conical heads being on an axis offset toward the grinding wheel from the axis of the article on the magnet.

10. A transfer mechanism in accordance with preceding claim 1 in which the said source is shaped to accommodate a plurality of sizes of articles and of which the said position to receive the said articles is independently adjustable.

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