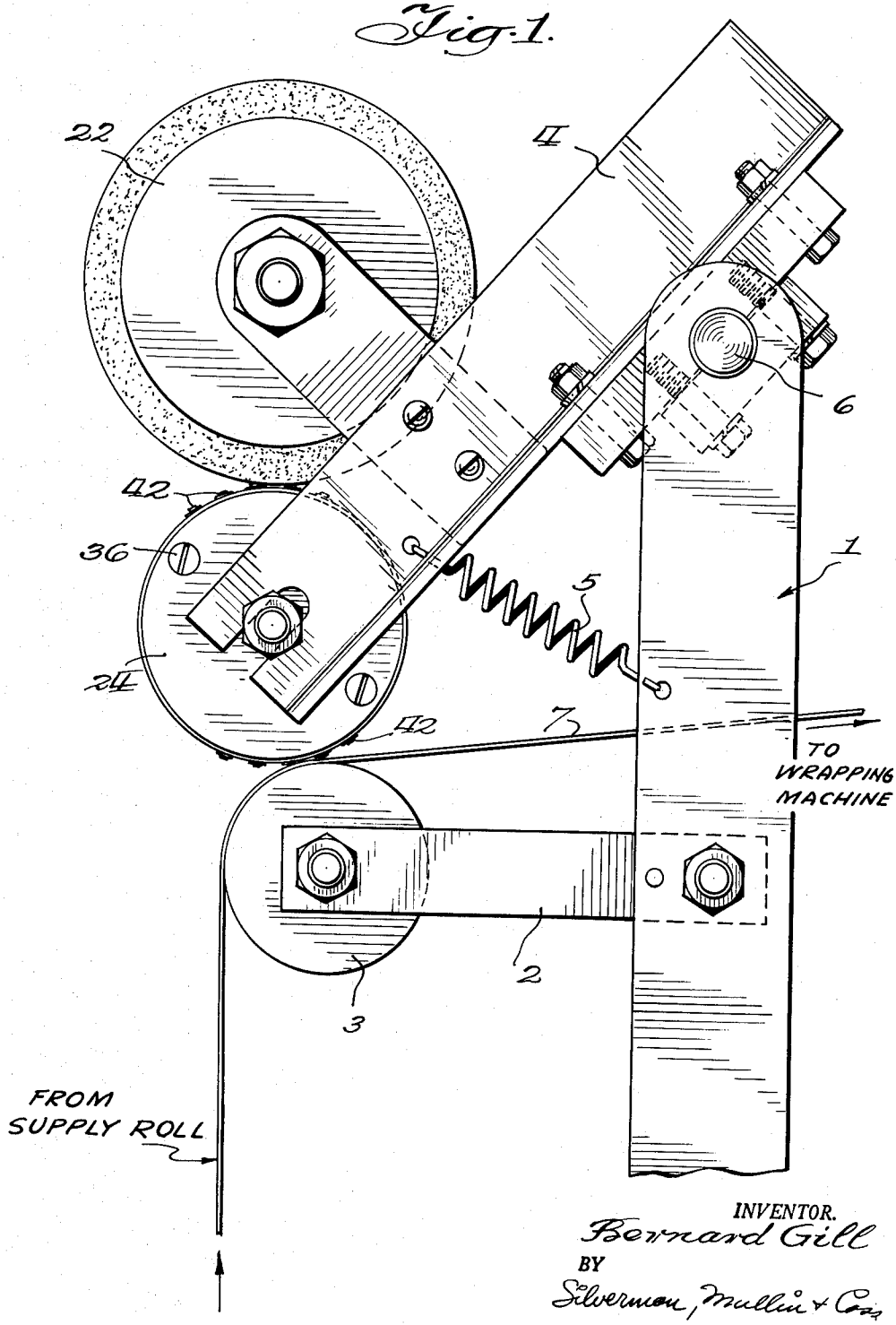
April 23, 1963 B. J. GILL 3,086,461

PRINTING WHEEL

Filed Oct. 25, 1961

2 Sheets-Sheet 1

Fig. 1.



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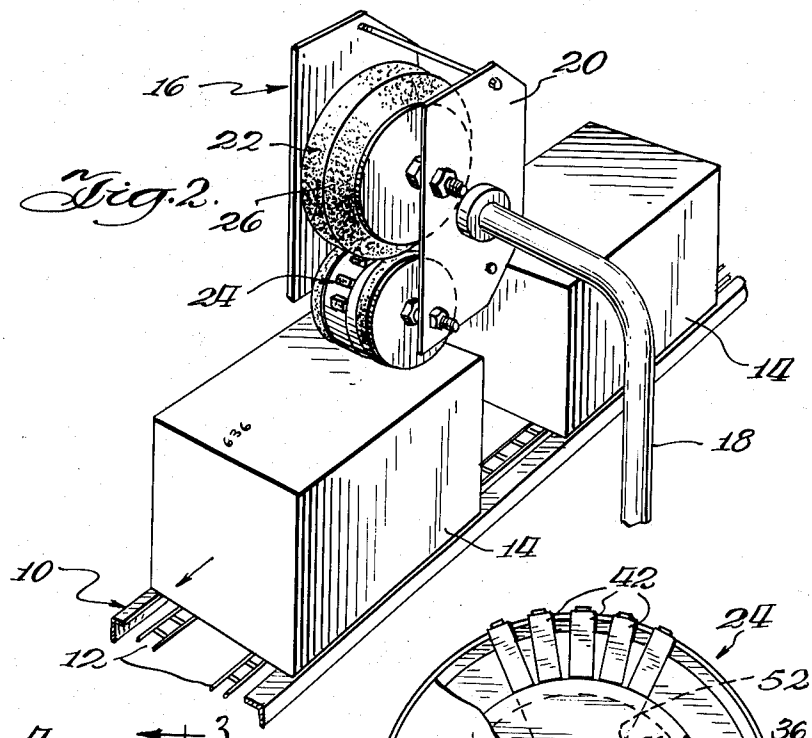


Fig. 2.

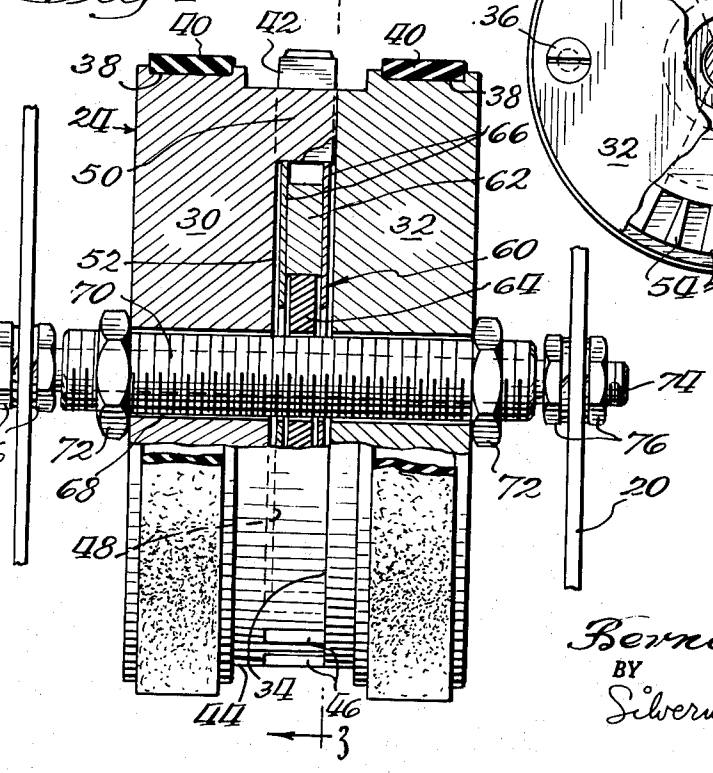


Fig. 4.

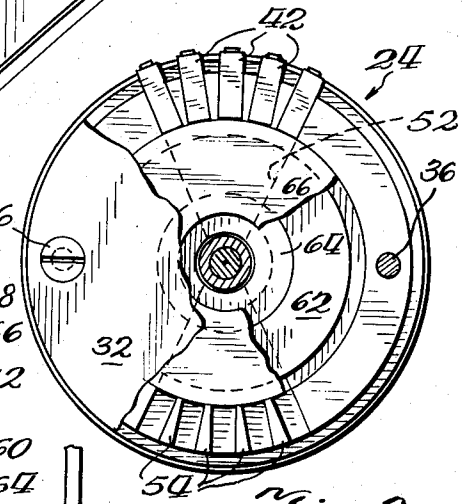


Fig. 3.

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PRINTING WHEEL

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This invention relates generally to printing wheels and more particularly is concerned with the construction of the printing wheel for use in apparatus wherein the printing characters are required to be changed frequently as, for example, in the case of code dating equipment.

Apparatus which is used for imprinting upon wrapping materials has in the past utilized printing wheels which have removable steel or iron alloy type mounted thereon. However, such apparatus has been used principally for printing code-dating indicia as distinguished from printing indicia such as flavors, names and the like using fine, thin lines of printing. Such type is normally hardened to withstand considerable wear. The type of wrapping materials which are imprinted are primarily wrapping materials for foods and ingredients of foods, and may comprise acetate cellulose, polyethylene, wax paper, parchment, metal foil and the like. The usual code dater applies such numbers, characters and the like upon the complete package where the surface of the package is capable of withstanding the impression or the type of package enables the same to be imprinted while complete. Such packakge imprinting code daters use printing wheels with rubber type, but the invention herein is not concerned with rubber type.

Rubber type is not suitable for use in most wrapping material printing apparatus because of a variety of reasons which include excessive wear, smearing, etc. Steel type printing wheels have been, and are capable of being used to imprint packages which have relatively firm surfaces, and to that extent the invention includes such application, but for the most part, steel type printing wheels are used to imprint continuous strips of wrapping materials, as stated above. The printing station for such apparatus is usually located immediately adjacent a wrapping machine, so that the material may be mounted on a roll and fed through the printing apparatus directly into the wrapping mechanism.

The printing apparatus for use with wrapping materials includes a printing wheel, inking wheel and a back-up wheel usually in the form of a rubber roller. The strip of wrapping material is driven or drawn between the printing wheel and the back-up roller so that the steel type impresses the strip into the back-up roller, applying an imprint. Friction means on the printing wheel may assist in limiting the depth of impression and assisting in the rolling movement of the wheels.

Printing wheels with removable metal type are expensive because they are difficult to make. In addition, when it is desired to replace the type, it is usually necessary to loosen a set screw by means of some suitable tool, replace the type and thereafter tighten the set screw. This takes considerable time and provides a possible source of trouble. Set screws which are not sufficiently tightened may release the type, enabling the same either to fall out completely or to dig into some packages.

The primary object of the invention is to provide a printing wheel of the kind which utilizes hardened metal type

but in which means are provided to hold the type in the printing wheel magnetically, thereby eliminating costly clamping means and also rendering the type readily replaceable.

A still further object of the invention is to provide a printing wheel having circumferential sockets or slots adapted to receive metal type therein and the wheel having on the interior thereof a magnetic member which firmly holds the type within the slots while enabling the type readily to be removed, if desired, and replaced with other characters.

Many other objects of the invention will become apparent to those skilled in this art as a description of the preferred embodiment proceeds. In this description, details of construction will be set out which give rise to the benefits and advantages of the invention. Considerable variation is capable of being made within the scope of the invention.

In the drawing:

FIG. 1 is a somewhat diagrammatic side elevational view of apparatus for applying an imprint to a strip of wrapping material with a printing wheel constructed in accordance with the invention.

FIG. 2 is a perspective view showing a printing wheel constructed in accordance with the invention being used on a conveyor line to apply numbers to packages moving down the said line.

FIG. 3 is a sectional view taken generally along the line 3—3 in FIG. 4 and in the indicated direction with portions shown in plan and other portions broken away.

FIG. 4 is a median sectional view taken through the printing wheel with portions shown in elevation and portions broken away to show details.

Generally, the invention comprises a wheel which is formed of some non-magnetic material such as, for example, brass or aluminum, having a magnetic member on the interior thereof. Sockets or recesses circumferentially arranged about the wheel communicate with the interior thereof and with the magnetic member. Metal type of some ferrous material is dropped into the slots and held in position by the magnet or by the magnetic member. When it is desired to replace the type, the exposed end is seized as, for example, by a pair of pliers, and the type pulled out against the attraction of the magnetic member. In normal use, the magnetic force applied to the type is greater than any centrifugal force which might tend to dislodge the type members from their respective slots during rotation of the wheel.

Referring now to FIG. 1, there is illustrated in said figure a support member **1** which may be a part of or a bracket secured to a wrapping machine which utilizes a continuous strip of flexible wrapping material in wrapping some merchandise. The support member **1** has a bracket **2** which is secured thereto for supporting thereon a rubber roller **3**. This rubber roller **3** is preferably of fairly firm although yielding rubber to serve as a back up member as will be understood. A second bracket **4** is mounted on the support and it carries a printing wheel **24** engaged against the roller **3**, and an inking wheel **22** preferably of foam rubber type, frictionally engaged against the printing wheel.

The printing wheel **24** is of the construction of the invention as will be brought out hereinafter, and is arranged to be firmly engaged against the rubber back-up

roller 3 by any suitable means, such as for example a spring 5 extending between the bracket 4 and the support 1. This would require the mounting 6 to be swingable. A strip of some wrapping material, shown at 7 is arranged to be stripped from a supply roll, passed between the printing wheel 24 and roller 3 and imprinted, and thence led to the wrapping machine. Means may be provided (not shown) to drive the roller 3, if needed.

The general arrangement described in connection with FIG. 1 is fairly well known, but for the construction of the printing wheel 24. Many different arrangements can be made, but these are all characterized by the provision of some form of back-up roller to serve as a platen or the like for the impression of the steel type of the printing wheel.

The wheel of the invention may be used in other environments where there may not be a need for the back-up roller 3, as for example in code dating apparatus operating directly upon the surfaces of packages. In such cases, the packages will have to have surfaces which are of a character and firmness to accept the imprint of steel type. FIG. 2 illustrates such an application.

Referring now to FIG. 2, there is illustrated in the said figure, a conveyor 10 including a belt or chain 12 along which containers such as shown at 14 are moved. A semi-portable code dating apparatus designated generally by reference character 16 is supported above the line of moving packages 14 on a suitable bracket 18. The bracket carries a framework 20 which mounts an inking wheel 22 and a printing wheel 24 in cooperative relation. The inking wheel 22 may be of a well known construction including a foam rubber disc 26 which is saturated with ink and rolls in contact with the periphery of the printing wheel 24. The printing wheel 24 in turn is arranged to roll against the top surfaces of the containers 14 as they pass and a spring arrangement which is not shown herein presses the wheel 24 against the said top surfaces.

As thus far described and, as a matter of fact, as appears in FIGS. 1 and 2, the structures are known. The only difference between the appearance of the printing wheel 24 of FIGS. 1 and 2 and the printing wheel as it has been constructed heretofore is that no visible means is shown for retaining the metal type in place. In the printing wheel as heretofore constructed, one would see set screws or the openings for such set screws in the side plates of the printing wheel. These are not seen either in FIG. 1 or FIG. 2, assuming that the structure of the printing wheel 24 is in accordance with the invention herein.

The details of the printing wheel 24 are shown in FIGS. 3 and 4.

As shown in FIG. 4, the printing wheel 24 is formed of two discs 30 and 32 which are engaged face to face along the parting line 34 by means of screws 36 which pass through the disc 32 and are threaded into the disc 30. The overall axial thickness of the disc 30 is substantially greater than that of the disc 32, the disc 32 preferably being of substantially uniform thickness except for its peripheral edge. At suitable locations about the circumferences of the respective discs 30 and 32, there are provided annular grooves 38 within which are seated rubber friction bands 40 whose purpose it is to engage upon the roller 3 of FIG. 1 or upon the upper surfaces of the containers 14 and cause rotation of the wheel by friction. Another function, of course, is to prevent the type which is shown at 42 from excessively digging into the surface of the roller 3 or the surfaces of the containers 14.

When the discs 30 and 32 are arranged in face to face engagement, there is an annular reduced diameter section designated 44 provided between the two friction bands 40. The majority of this section is provided by the disc 30, as one may see by examining the parting line 34 with relation to the section 44. This section 44 has slots or sockets formed therein at circumferentially spaced locations. The sockets 46 are normally in groupings of several sockets. In the particular embodiment shown, the grouping consists of five sockets and there are two diametrically opposite groupings. It is feasible to have more than two groupings.

The construction of the disc 30 provides an annular cavity 48 which gives rise to an integral flange or ring 50 which defines the cavity 48. The slots 46 are cut in the ring 50 since the axially outward limit of the slot coincides with the parting line 34. The slots are somewhat deeper than the cavity in the respect that they bite axially into the disc 30 a greater distance than the cavity 48. Normally the slots are milled and where the groupings are to be spaced as shown, it is a simple matter to mill directly across the work piece, thereby forming one slot in each of the groupings. Five passes will thereby produce five slots on opposite sides of the disc 30 assuming, of course, that a slot is cut with each pass. A triangular depression 52 is formed by this milling. Obviously, other ways of forming the slots 46 may be used. After the slots have been formed, there will be separating wedge-shaped wall formations 54 between slots.

A magnetic assembly which may be designated generally 60 is located in the cavity 48. This assembly consists of an annular magnet 62 of some highly magnetic material such as, for example, an alloy of aluminum, nickel, cobalt and iron, commercially available on the market today under the trademark Alnico, a product of General Electric Company of Edmore, Michigan. Aluminum spacer 64 of annular configuration provides centering for the magnet 62 and the magnet is sandwiched between a pair of annular soft iron plates 66 whose circumference is the same as the inner circumference of the ring 50 so that the plates 66 fit snugly within the cavity 48. Obviously, the left-hand plate 66 will seat upon the bottom of the cavity 48 axially spaced slightly from the bottom surfaces of the triangular depressions 52. When the disc 32 is secured in place on the disc 30, a space similar to that provided by the triangular portion 52 is permitted to exist and, if desired, bosses may be provided on the disc 32 to assure such space. In this manner, the two plates 66 will have their peripheral edges disposed at the bottom of each of the slots or cavities 46 but spaced slightly inwardly from the edges of the cavity considered in an axial direction.

The entire wheel 24 is provided with a central bore 68 within which a bushing 70 is secured by means of the nut 72. A central shaft 74 passes through the bushing and is secured to opposite parts of the frame 20 by means of the nut 76. The wheel is thereby free to rotate.

When it is desired to install the type 42, the type is pushed into the desired slot 46 and is attracted to the exposed peripheral edges of the plates 66. The type is very firmly held in this manner and when it is desired to remove the same, the exposed portion of the type is seized with a pair of pliers or tweezers and simply pulled away from the attraction exerted by the magnetic assembly 60. Set screws and any other clamping devices are thereby eliminated.

It will be noted that the magnet 62 is relatively small. It is preferable that the magnetic polarization of this magnet be such that there is a substantially uniform high strength field exerted in all directions about the periphery of the magnet. The use of the plates 66 not only extends the field of the magnet 62 a substantial distance circumferentially outward by means of relatively inexpensive material, but in addition serves to concentrate the magnetic flux at two locations on opposite edges of the respective type members. This gives more stability and greater holding power. The type is less likely to rock or move because of the plates 66. The invention thereby enables a plurality of printing types to be used on the same wheel.

It is obvious that this form of printing wheel may readily be incorporated into any portable or permanent installations using metal type wheels where it is desired to change the type from time to time.

What it is desired to secure by Letters Patent in the United States is:

1. A printing wheel comprising, an annular member of non-magnetic material adapted to be mounted for rotation and having annular magnetic means in the interior of and coaxial with and spaced below the periphery of the wheel, a plurality of slots each opening to said periphery and circumferentially arranged about the wheel, each slot communicating with said annular magnetic means at the perimeter of said means to establish a substantially uniform magnetic field around said perimeter adjacent the bottom ends of said slots whereby metal type members disposed within said slots respectively will be attracted and firmly held in said slots substantially entirely by said magnetic means.

2. A printing wheel as claimed in claim 1 in which said magnetic means includes at least a magnet and flux concentrating means extending from said magnet and presented to each slot.

3. A printing wheel as claimed in claim 1 in which said magnetic means comprise an annular magnet having a pair of coaxially arranged flux transmitting plates of greater diameter than the magnet engaged on opposite sides of the magnet, and the peripheral edges of the plates being disposed at the bottom of each slot.

4. A printing wheel as claimed in claim 1 in which said annular member is provided with an inner cavity and said magnetic means is disposed within said cavity.

5. A printing wheel comprising, an annular member of non-magnetic material adapted to be mounted for rotation and having annular magnetic means coaxial therewith, a plurality of slots circumferentially arranged about the wheel and each slot communicating with said annular magnetic means at the periphery thereof whereby metal type members disposed with said slots will be attracted to and firmly held by said magnetic means, said annular member being formed of a pair of annular disc members of differing thickness secured in facing relation one to the other and said slots being formed at the periphery of the thicker one of said disc members, said one of said members having a central cavity formed therein and said slots being formed in communication with said central cavity, said magnetic means comprising, an annular magnet and a pair of coaxially arranged flux transmitting plates of greater diameter than the magnet, said plates being arranged spaced one from the other with the magnet therebetween, the peripheral edges of said plates communicating with said slots with said magnetic means being seated within said central cavity.

6. A printing wheel adapted to be frictionally rotated upon a surface to be imprinted, said printing wheel comprising an annular body having an internal cavity, a pair of annular friction bands formed on the circumference of said wheel closely adjacent the sides thereof, a reduced diameter section between said pair of friction bands, a plurality of spaced socket portions communicating with said cavity arranged in at least one grouping thereof and having openings in said reduced diameter section, a plurality of metal type members removably engaged in said socket portions, and type retaining means comprising a magnetic assembly disposed within said cavity in magnetic communication with said socket portions to magnetically retain said type members within said socket portions.

7. A printing wheel adapted to be frictionally rotated upon a surface to be imprinted, said printing wheel comprising an annular body having an internal cavity, a pair of annular friction bands formed on the circumference of said wheel closely adjacent the sides thereof, a reduced diameter section between said pair of friction bands, a plurality of spaced socket portions communicating with said cavity arranged in at least one grouping thereof and having openings in said reduced diameter section, a plurality of metal type members removably engaged in said socket portions, and type retaining means comprising a magnetic assembly disposed within said cavity in magnetic communication with said socket portions to magnetically retain said type members within said socket portions, said magnetic assembly comprising a magnetizing medium in communication with the said socket portions.

8. A printing wheel adapted to be frictionally rotated upon a surface to be imprinted, said printing wheel comprising an annular body, a pair of annular friction bands formed on the circumference of said wheel closely adjacent the sides thereof, a reduced diameter section between said pair of friction bands, a plurality of spaced socket portions arranged in at least one grouping thereof and formed in said reduced diameter section, a plurality of metal type members adapted to be removably engaged in said socket portions, and type retaining means comprising a magnetic assembly disposed within said annular body in magnetic communication with said socket portions to magnetically retain said type members within said socket portions, said magnetic assembly comprising an annular magnet and a pair of concentrically arranged spaced plate members having the magnet mounted therebetween, said plate members being of greater diameter than the annular magnet whereby the bottom ends of said sockets extend within the magnetic field of said magnetic assembly.

9. A printing wheel adapted to be frictionally rotated upon a surface to be imprinted, said printing wheel comprising an annular body, a pair of annular friction bands formed on the circumference of said wheel closely adjacent the sides thereof, a reduced diameter section between said pair of friction bands, a plurality of spaced socket portions arranged in at least one grouping thereof and formed in said reduced diameter section, a plurality of metal type members adapted to be removably engaged in said socket portions, and internal type retaining means comprising a magnetic assembly disposed within said annular body in magnetic communication with said socket portions and exerting a uniform magnetic field in all directions about the periphery of said magnetic means to magnetically retain said type members within said socket portions, said annular body being provided with an internal cavity in communication with said socket portions and said magnetic assembly being seated within said cavity.

10. In a code dating apparatus including support means, an inking wheel, a printing wheel, means for mounting said inking wheel and printing wheel in cooperative rotary relationship on said support means; said printing wheel comprising, an annular member formed of a pair of annular discs of non-magnetic material, a central cavity formed in one of said discs, said discs being secured together face to face to provide an internal cavity in said wheel, a plurality of sockets arranged in at least one circumferential grouping on said printing wheel in communication with said cavity, type members of ferromagnetic material removably received within said sockets, and magnetic circuit means mounted in said cavity concentric with said discs and in communication with the said sockets to form a magnetic field thereacross for magnetically retaining the type members therein.

11. The structure as claimed in claim 10 in which said magnetic circuit means comprises an annular magnet disposed within the cavity in said annular member and flux concentrating means disposed adjacent said magnet capable of extending the magnetic field in communication with the socket portions.

12. In a code dating apparatus including support means, an inking wheel, a printing wheel, means for mounting said inking wheel and printing wheel in cooperative rotary relationship on said support means; said printing wheel comprising, an annular member formed of non-magnetic material, a plurality of sockets arranged in at least one circumferential grouping on said printing wheel, type members of ferromagnetic material adapted to be removably received within said sockets, and mag-

netic circuit means in communication with the said sockets to form a magnetic field thereacross for magnetically retaining the type members therein, said magnetic circuit means comprising an annular magnet disposed within said annular member and having a uniform magnetic field in all directions about the periphery of said magnet and a pair of annular plate members having said magnet sandwiched therebetween, said plate members extending over the peripheral edges of said magnet and in communication with the bottom portion of said sockets.

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