May 17, 1966 R. K. SEDGWICK ET AL 3,251,150

IDENTIFYING MEANS FOR TOOLS

Original Filed March 30, 1959 3 Sheets-Sheet 1

Fig. 1

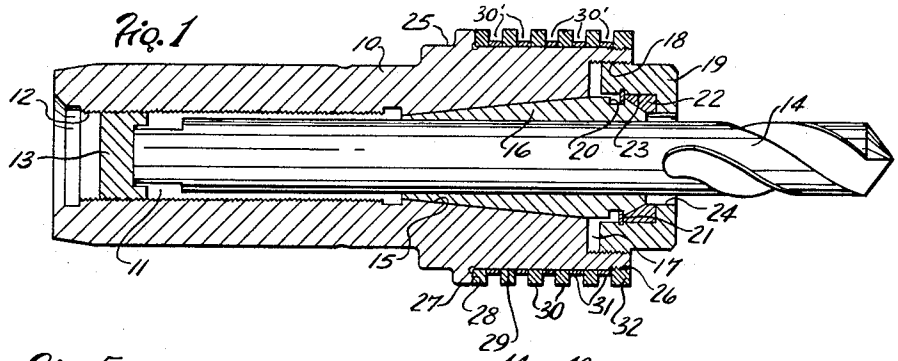


Fig. 5

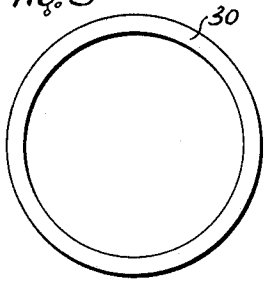


Fig. 2

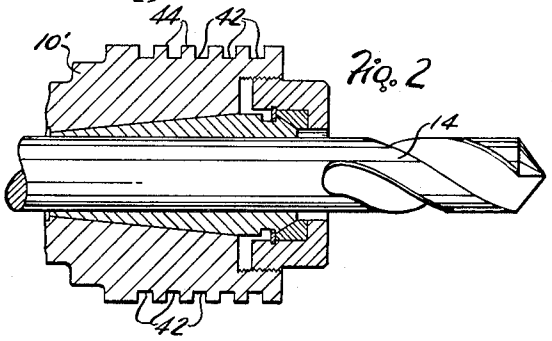


Fig. 6

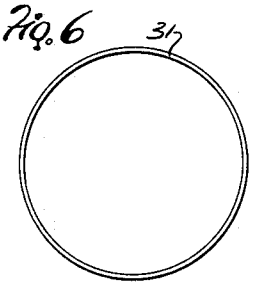
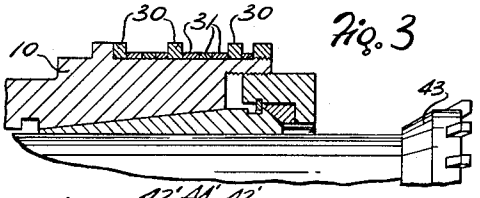


Fig. 3



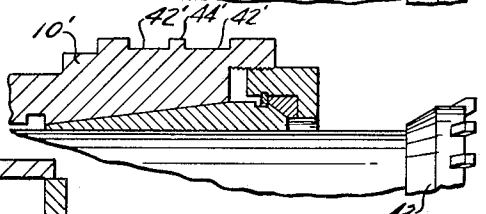
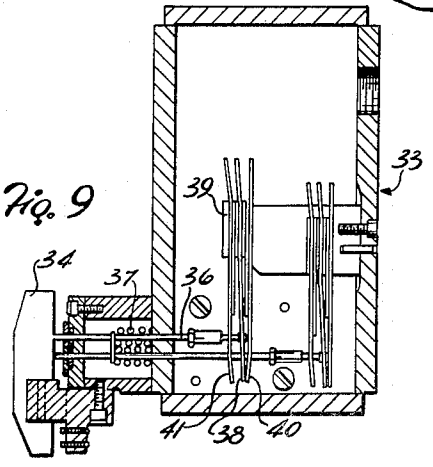


Fig. 4

Fig. 9



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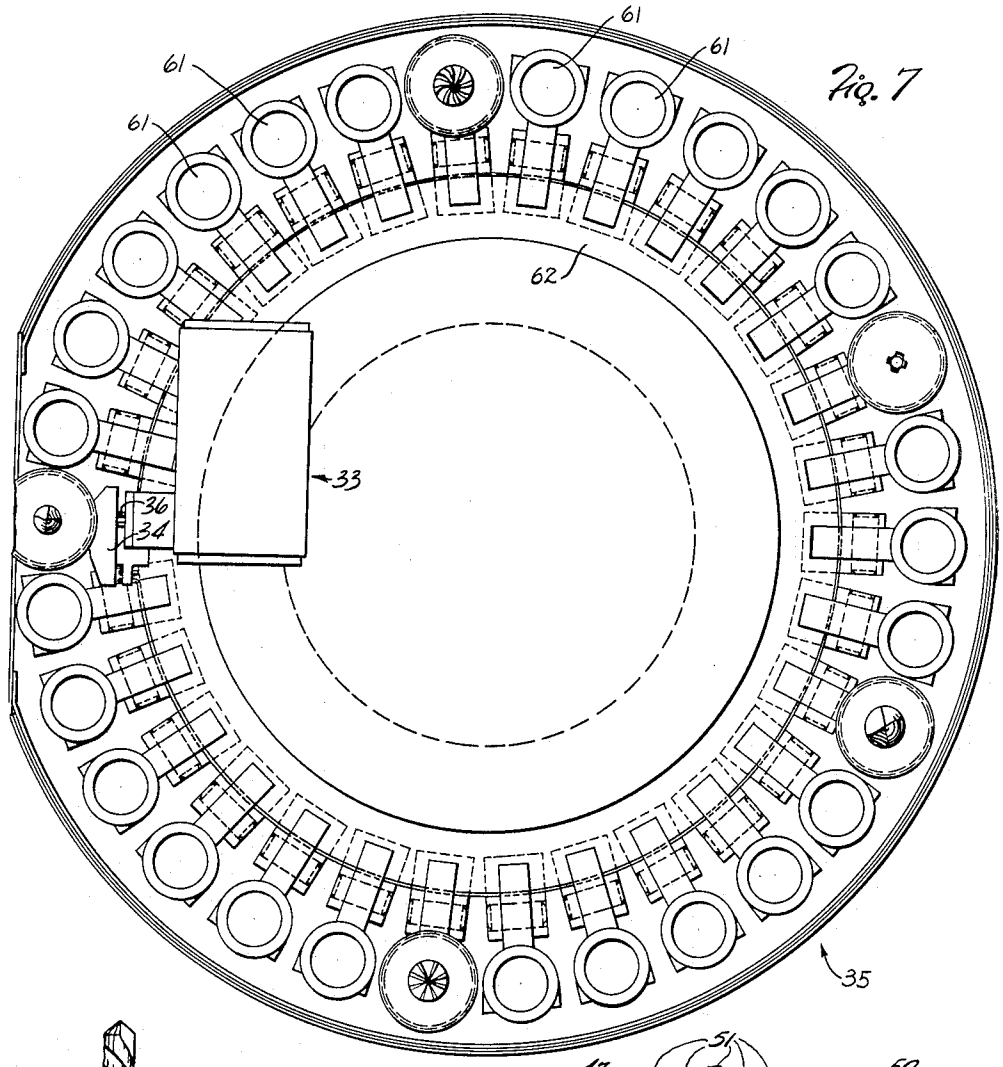


Fig. 7

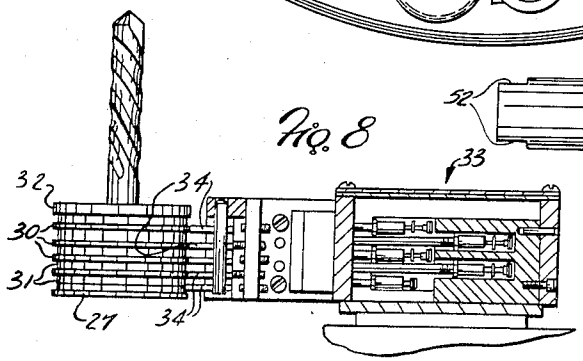


Fig. 8

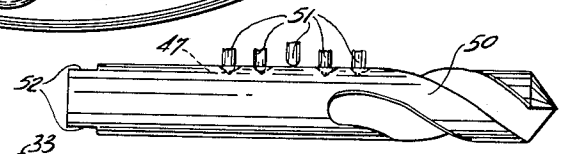


Fig. 10

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Fig. 11

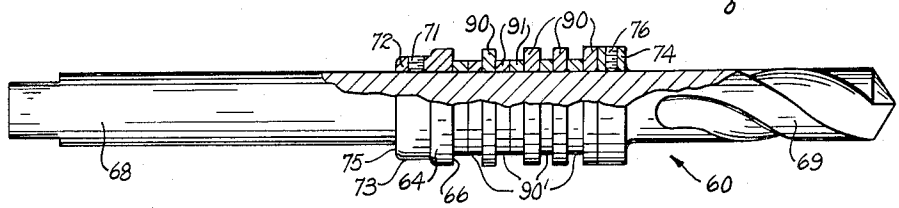


Fig. 12

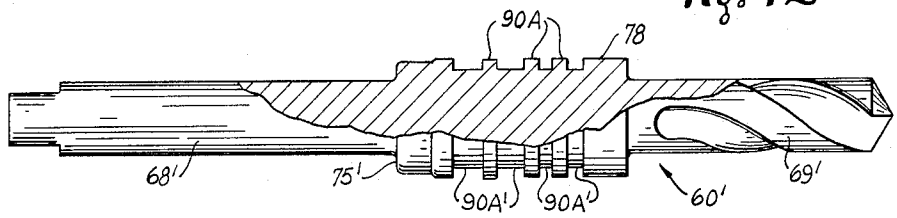


Fig. 13

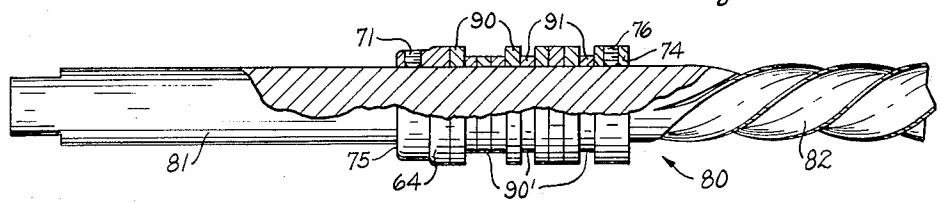
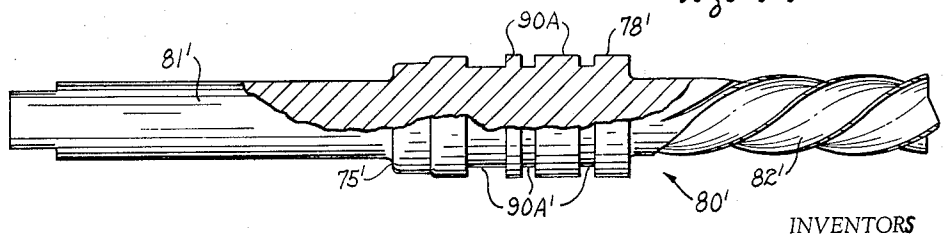


Fig. 14



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3,251,150
IDENTIFYING MEANS FOR TOOLS

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Continuation of application Ser. No. 802,924, Mar. 30, 1959, now Patent No. 3,052,999, dated Sept. 11, 1962. This application Aug. 28, 1962, Ser. No. 219,908
The portion of the term of the patent subsequent to Sept. 11, 1979, has been disclaimed
2 Claims. (Cl. 40—2.2)

The present invention relates to a new and improved tool provided with novel structure arranged in code fashion for identifying the tool.

The present application comprises a continuation of the Sedgwick et al. application Serial No. 802,924, filed March 30, 959, now Patent No. 3,052,999, dated September 11, 1962, which, in turn, was a continuation-in-part of U.S. application Serial No. 744,976, filed June 27, 1958, now Patent No. 3,052,011, dated September 4, 1962. The Sedgwick Patent, 3,052,999, is directed to a species of the instant invention wherein the adjustable code elements are applied on a tool holder which is adapted to receive a tool. The instant invention is directed to the placement of the code elements on the tool itself. The use of the word "tool" in the claims herein is directed specifically to the tool element or bit itself and not to the combination of a tool and a holder therefor.

The primary object of the present invention resides in the provision of a new and improved tool provided with identifying means for facilitating the selection of a desired tool from a plurality of different types and sizes of tools.

Another object of the present invention resides in the provision of coded information on each tool for the purpose of identifying the different tools in a group of tools of different types and sizes.

Another object of the present invention resides in the provision of an improved identifying means in the form of different contours on the tool to facilitate the selection of different tools from a plurality of different types and sizes of tools.

Another object is to provide a new and improved tool provided with identifying means in binary code fashion by means of which the selection of any desired tool from a plurality of different types and sizes of tools is facilitated.

Another object is to provide a new and improved means in the form of a plurality of axially spaced differently positioned grooves on each of the tools for facilitating the selection of a particular tool from the plurality of tools of different types and sizes.

A further object of the invention resides in the provision of differently positioned lands and grooves on each tool for facilitating the selection of one particular tool from a plurality of different types and sizes of tools.
of tools.

A more specific object is to provide a series of abutting axially aligned rings of different diameters on the shank of each tool to thereby provide lands and grooves in different combinations on each tool and coded in a manner for separately identifying each of the tools to facilitate the selection of a particular tool from a plurality of different types and sizes of tools.

Other objects and advantages of the present invention will become apparent from the following description of illustrative embodiments thereof.

In the drawings:

FIGURE 1 is a longitudinal axial sectional view through a toolholder embodying the teachings of the present invention for identifying any particular tool mounted in the toolholder, the identification for the particular tool being incorporated with the toolholder as claimed in the aforementioned Sedgwick patent;

FIG. 2 illustrates a modified form of the invention shown in FIG. 1 for identifying the identical tool shown in FIG. 1;

FIG. 3 is a fragmentary sectional view similar to FIG. 1 showing the coding on the tool arranged for identifying a different tool;

FIG. 4 is a fragmentary view showing the structure of FIG. 2 with the lands and grooves arranged in a different combination for identifying the identical tool shown in FIG. 3;

FIG. 5 is an elevational view of one of the ring elements shown in FIG. 1;

FIG. 6 is an elevational view of one of the spacer rings shown in FIG. 1;

FIG. 7 is a front elevational view of a rotatably mounted magazine adapted to carry a plurality of different sizes and types of material removing together with selector means engageable successively with the several toolholders to effect the automatic selection of any particular tool from the plurality of tools at a tool selector and change station of the machine;

FIG. 8 is a bottom view of the selector means shown in FIG. 7 with the selector means engaging the coding structure on the toolholder for effecting the automatic selection of a particular tool from the plurality of different types and sizes of tools;

FIG. 9 is a front elevational view of the selector means shown in FIG. 8 with parts broken away to reveal the operating mechanism and a portion of the selector control means;

FIG. 10 is an elevational view of a tool provided with a modified coding structure;

FIG. 11 is an elevational view of a tool provided with coding structure mounted directly on the shank of the tool for identifying the tool;

FIG. 12 illustrates a tool similar to that shown in FIG. 11 with the coding structure formed integrally with the shank of the tool;

FIG. 13 is an elevational view partly broken away illustrating the coding structure of FIG. 11 with the coding rings arranged in a different combination than that shown in FIG. 11 for identifying a different tool; and

FIG. 14 is an elevational view of a tool equipped with the coding structure shown in FIG. 12 and having the lands and grooves arranged in the combination for identifying the same tool that is illustrated in FIG. 13.

The present invention, when applied to tools, is adapted for use in effecting either visual or manual selection of a particular tool from a plurality of different types and sizes of material removing tools. It is also particularly well adapted for use in conjunction with automatic means for effecting the selection of a particular type and size of tool from the plurality of many types and sizes of tools.

In accordance with present production methods, it is common practice to effect a number of changes of different types of tools in a single machine to cut the cost of manufacture and expedite production. The present invention lends itself to the rapid manual or automatic selection of the desired tool or tools to reduce to a minimum the required time in effecting tool changes.

The present invention contemplates the use of a variety of identifying means on the several individual tools to designate both size and type of tool and it is to be understood that the forms of the present invention shown in the accompanying drawings are for illustrative purposes only.

The different identifying means for each of the various types and sizes of tools may be that of contour, external

formations, suitable lands or grooves or combinations thereof to constitute coded information for identifying the various sizes and types of tools.

Referring more particularly to FIGURE 1 of the accompanying drawing, a toolholder **10** preferably of cylindrical form includes an axial bore **11** provided with threading **12** adapted to receive a positioning plug **13** against which the inner end of a tool **14** is positioned. The inner end of the axial bore **11** is contiguous with a bore **15** which extends forwardly and outwardly to form a conical opening adapted to receive the segments of an axially split sleeve **16** which has the identical taper as that of bore **15**. The outwardly flaring bore **15** terminates in a cylindrical cavity **17** provided with internal threading **18** adapted to receive the threaded portion of a tool clamping ring **19**. The forward portion of the split sleeve **16** is provided with a circumferentially extending groove **20** for receiving a snap ring **21** which also engages the clamping ring **19** to couple these two members for conjoint action. The forward end of each of the parts of the split sleeve **16** are of tapered form adapted to be contacted by the inner surface of a tapered compression ring **22** seated in a socket **23** formed in the tool clamping ring **19**. An axially disposed bore **24** in the ring **19** serves as an opening through which the shank of the tool may be inserted. After the tool has been inserted in the holder **10**, the clamping ring **19** is tightened in the toolholder **10** to force the split sleeve **16** rearwardly into the bore **15** to cause the walls of the bore **15** to compress the walls of the split sleve **16** about the shank of the tool **14** for retaining the tool in fixed operating position therein.

The rearward portion of the toolholder **10** is of cylindrical form that is receivable in the spindle of the machine. The holder **10** includes an enlarged cylindrical forward portion **25** terminating at its forward end in external threading **26**. A flange **27** having a machined front face **28** is disposed at the inner end of a machine cylindrical surface **29**. A plurality of rings **30** and **31** are adapted for slidable receipt on the machined cylindrical portion **29** of the toolholder **10** to provide the identifying means for a particular tool **14**, which in the present instance is a particular size of drill.

The exemplary embodiment provides a coding based on the binary numbering system in which each digit of the binary number is either "off" or "on" as represented by a "0" or "1" respectively in this description. The illustrated toolholder **10** is provided with five annular bits on the cylindrical surface **29** with each bit representing one digit of the binary numbering system. Each bit is spaced from the succeeding bit by an annular groove or space **30'**, as shown in FIG. 1. The proper coding for identifying the particular tool **14** in the toolholder **10** is established by placing either a large diameter ring **30** or a small diameter ring **31** in the designated bit locations on the cylindrical surface **29**. If the bit is occupied by a large diameter ring **30**, the digit of the binary number which that bit represents is "on" as indicated by the numeral **1**. On the other hand, if the bit is occupied by a small diameter ring **31**, the digit of the binary number which that bit represents is "off" as indicated by the numeral 0. Accordingly, the large diameter rings **30** on the cylindrical surface **29** indicate the numeral "1" for the corresponding digits of the binary number while the small diameter rings **31** on the cylindrical surface **29** indicate a "0" for the corresponding digits of the binary number.

Although the small diameter rings **31** constitute a part of the tool identifying coding by representing the numeral "0" when they are located in the bit positions on the cylindrical surface **29**, they also serve as spacers for forming the annular spaces **30'** between each of the bit positions. Thus, a small diameter ring **31** will be placed between each of the bit positions on the cylindrical surface **29** wherein it serves solely as a spacer for spacing the rings **30** and **31** that are located in the adjacent bit positions. The rings **30** therefore serve as a spacer when located between the bit positions, but constitute a part of the identifying coding when they are in any of the five bit positions on the cylindrical surface **29**.

The series of rings **30** and **31** are retained in abutting face to face relationship on the surface **29** of the holder **10** by the application of an internally threaded clamping ring **32** on the threading **26**. The five digits of the binary numbering system represented by the five bits on the cylindrical surface **29** provide for all numbers up to thirty-one so that thirty-one different tools can be identified by thirty-one different combinations of rings **30** and **31** in the bit positions on the surface **29**. Under this arrangement, the binary number 00001 will identify tool No. 1, while the binary number 11111 will identify tool No. 31. The peripheral surfaces of the rings **30** and **31** in the bit positions on the surface **29** serve as coded radially extending projections to respectively designate the digits "1" and "0" of the binary system to constitute a coding for identifying each of the tools contained in the respective toolholders **10**.

As fully described in U.S. Patent No. 3,052,011 issued to Wallace E. Brainard et al., on September 4, 1962, the toolholders **10** with their associated tools are each inserted into one of a plurality of sockets or receptacles **61** mounted in a rotary member **62** of a tool storage magazine **35**. The coding formed by the rings **30** and **31** on the tools in the sockets **61** are read by a selector or tool indicator **33** illustrated in FIGS. 7, 8 and 9. The selector **33** includes five movable fingers **34** which are yieldably urged forwardly and are engaged by the rings **30** or **31** as the several tools are moved past the fixedly positioned selector **33** under the rotating movement of the member **62**. Each of the fingers **34** is carried by a separate rod **36** which is surrounded by a spring **37** that serves to urge the fingers **34** toward the rings **30** and **31** on the several toolholders **10**. The inner end of each rod **36** is connected to a movable contact bar **38** of a switch **39** which is a double throw switch provided with two stationary contacts **40** and **41** that form part of an electrical system upon which is impressed the number of the particular tool desired for the next successive machining operation.

As each of the toolholders **10**, removably supported in the magazine **35**, pass the fixedly positioned selector **33**, the rings **30** in the bit positions on the surface **29** of successive toolholders engage the fingers **34** and force them rearwardly against the pressure of their cooperating springs **37** to actuate the associated switches **39**. The rings **31** are not of a sufficient diameter to engage the fingers **34** for actuating the switches **39**. Accordingly, when a bit position on the surface **29** is occupied by a ring **30**, the corresponding switch **39** which represents the same digit of the binary number is actuated as the toolholder passes by the tool selector **33**. On the other hand, when the same bit position is occupied by the smaller diameter ring **31**, the corresponding switch **39** in the selector **33** is not actuated when the toolholder is moved past the selector and the switch remains in its normal position.

Since the toolholders **10** are each provided with five bit positions for identifying thirty-one different tools, the selector **33** is likewise provided with five switches **39** that cooperate with the respective five bit positions on the toolholders. The rings **31** serve as actuators for actuating the five switches **39** in different combinations depending upon the arrangement of the rings **31** on the surfaces **29** of the different toolholders **10**. The number of the desired tool is first impressed upon the electrical control system (not shown), and when the switches **39** are actuated in the combination which represents the same number that was impressed upon the control system, the rotation of the tool storage member **62** is automatically stopped with the specified tool in position to be withdrawn from the tool storage magazine and transferred to the spindle of the machine.

Referring more particularly to FIG. 8, it will be noted that the four rear fingers **34** of the selector **33** are in contact with four rings **30** while the front finger **34** is in contact with a ring **31**. The binary number for the particular toolholder in contact with the selector **33** is "11110" and, if this is the same binary number that was impressed upon the electrical control system, the movement of the tool storage magazine will stop as a result of the action of the engaged fingers **34** producing respective corresponding coded actuation of the switches **39** which they control. When the fingers **34** are engaged by the rings **30**, the digit "1" of the binary coding as indicated and when the fingers **34** are engaged by the rings **31**, the digit "0" is indicated. Likewise, when the fingers **34** are engaged by the rings **30**, the movable contact **38** of the associated switch **39** is moved into contact with the stationary contact **40** of the particular switch **39**, as illustrated in FIG. 9. On the other hand, when the fingers **34** are engaged by the rings **31**, the movable contact **38** of the associated switch **39** remains in electrical contact with the stationary contact **41** of the particular switch.

From the foregoing description, it will be understood that the rotary member **62** of the tool storage magazine **35** will continue to rotate to successively bring the several toolholders **10** to the stationary selector **33**. As each toolholder reaches the selector, the several fingers **34** engage the rings **30** or **31** disposed on the cylindrical surfaces **29** of the several toolholders **10** and this operation continues until such time as the coded information contained on the toolholder containing the desired tool matches the coded information impressed upon the electrical control system. When the desired tool has thus been selected the control circuit operates to shut off the driving power to the rotary member **62** and the selected tool is in position to be transferred to the spindle of the machine tool.

Referring more particularly to FIG. 2 of the drawings, there is shown a modified form of the toolholder coding means illustrated in FIG. 1. It will be noted that the identical tool in the form of a drill **14**, as shown in FIG. 1, is mounted to a toolholder **10'**. The toolholder **10'** bears the identical coded information on its periphery as presented by the removable rings **30** on the periphery of toolholder **10** in FIG. 1. However, it will be noted that the removable rings **30** are replaced by annular radial projections or rings **44** that are integrally formed on the periphery of the forward portion of the toolholder **10'**. Such lands or rings **44** are produced by forming grooves **42** on the periphery of the forward portion of toolholder **10'**. Although they are formed integrally with the toolholder **10'**, the rings **44** and grooves **42** serve the same purpose as the removable rings **30** and grooves **30'** of toolholder **10** in FIG. 1.

Referring more particularly to FIG. 3, it will be noted that a milling cutter **43** of a particular size and type is mounted in a toolholder **10** which is identical to the toolholder **10** shown in FIG. 1. However, since the tool **43** is of a different size and type than the tool **14** shown in FIG. 1, the identifying means, in the form of coded information, comprises the rings **30** and **31** arranged in a different combination so that the binary code number of this particular tool **43** is represented by the number "10101" while the tool **14** shown in FIG. 1 is represented by the binary code number "11111."

FIG. 4 illustrates the identical milling cutter **43** that is shown in FIG. 3, mounted in a toolholder **10'** which is of the same type as that shown in FIG. 2. The coding structure shown in FIG. 4 is formed integrally with the toolholder **10'** in the same manner as indicated in FIG. 2 but the annular lands **44'** and grooves **42'** are arranged in a different combination to identify the same milling cutter **43** that is depicted in FIG. 3. Accordingly, the rings **44'** and grooves **42'** of FIG. 4 designate the binary code number "10101" which is the identical binary number

represented by the removable rings **30** and **31** in FIG. 3. By varying the position and relationship of the rings **44'** and grooves **42'** on toolholder **10'**, any binary code number may be produced that is capable of being designated by the removable rings **30** and **31** of toolholder **10** in FIG. 3.

FIG. 10 of the drawings depicts a modified embodiment of the tool coding means illustrated in FIG. 1. It will be noted that the coding means comprises recesses **47** integrally formed in the shank of a tool **50**, at designated locations referred to herein as bits, rather than placing the coding means on the toolholder as illustrated in the prior embodiments. It should be noted further that the absence of a recess or recesses **47** at the bit locations in the shank of the tool is also a part of the coding means. Therefore, the presence or absence of recesses **47** at the designated bit locations on the shank of the tool **50** determines its identifying code number. The tool **50** may be stored in a storage medium in a manner that it can be carried past a tool selector that will read the code on the tool **50**. To read the code on the tool **50** the several plungers **51** of a tool selector (not shown) similar to selector **33** of FIG. 8 are brought into contact with the cooperating bits on the tool **50** that are designated to contain the coding means by the absence or presence of a recess **47**. When the plungers **51** are in contact with the recesses **47**, the digit "0" of the binary coding is indicated and when the plungers **51** are in contact with the periphery of the shank of the tool **50**, because no recess is formed in that bit location, the digit "1" is indicated. In FIG. 10, the binary code number "00100" is designated by the recesses **47** and the shank of the tool **50**. By varying the position and relationship of the recesses **47**, any binary code number may be produced on the tool **50** that is capable of being produced on the toolholder shown in the other embodiments. Since the coding recesses are provided on only one side of the tool **50**, the tool may be conveniently positioned in the storage medium by means of the flats **52** to properly locate the bit areas of the coding means with respect to the plungers **51**.

FIGS. 11, 12, 13 and 14 illustrate the tool coding means applied directly to tools for identifying the type and size of the tool. FIG. 11 depicts a drill **60** of a size that is different from the size of the drill **14** shown in FIG. 1. The tool **60** is provided with a shank or body portion **68** of cylindrical form that is receivable in the spindle of a machine. The coding means are affixed directly to the shank or body **68** of the tool at designated locations in a manner to be operable to coact with the selector or tool indicator **33** shown in FIG. 1.

In order to locate the coding means in a designated location, a positioning flange **64** having a machined front face **66** is mounted on the cylindrical body portion **68** of the tool adjacent to the work performing portion **69** of the tool. The positioning flange **64** is affixed to the body of the tool in the desired position by means of a set screw **71** which is threadedly disposed in a suitable radially threaded opening **72** formed in a rearwardly extending collar portion **73** integrally formed with the positioning flange.

The identifying coding on the tool **60** shown in FIG. 11 comprises a plurality of rings **90** and **91** that slide onto the shank **68** of the tool **60** and are secured in position, in abutting face to face relationship between the flange **64** and a clamping ring **74** that is fixed on the shank **68** by a set screw **76**. The rings **90** and **91** are very similar to the rings **30** and **31** that were described as applied to the toolholder **10** shown in FIG. 1, but are of a reduced diameter to adapt them for mounting directly on the shank of the tool **60**, as shown in FIG. 11, instead of on the toolholder in the manner depicted in FIG. 1. The rings **90** are of a larger diameter than the rings **91** so that they function in the same manner as the rings **30** to actuate the switches **39** in the selector **33**

through engagement with the fingers **34** as previously described. The rings **91**, like the rings **31**, are not of sufficient diameter to cause the actuation of the switches **39** as the tool **60** passes the selector or reading head **33**. Such difference in the diameters of the rings **90** and **91** results in the rings **90** forming lands along the coding area on the shank **68** of the tool **60** and the smaller diameter rings **91** produce grooves **90'** interspersed between the lands in different combinations to constitute the coding for identifying the different tools.

The tool identifying coding shown in FIG. 11 is further distinguishable from the coding depicted in FIGS. 1 to 4 insofar as it includes ten bits on the tool shank that represent ten digits of the binary numbering system in lieu of the five bits that are provided in the binary coding on the toolholders in FIGS. 1 to 4. As a result, the exemplary embodiment depicted in FIG. 11 has the capacity to identify 1023 different tools as compared to the capacity to identify thirty-one different tools for the five digit binary system. This substantial increase in capacity is achieved without increasing the length of the coding assembly by eliminating the spaces between adjacent bits. Thus, in the embodiment of FIG. 1, the small diameter rings **31** are utilized not only as coding elements, but also as spacers on the surface **29** to form spaces **30'** between the several bits. Such spaces are eliminated in the coding structure of FIG. 11 so that the rings **91** do not at any time function as spacers but serve solely as coding elements. The ten bits are directly adjacent to each other with no space between them, and when a ring **91** is mounted on the shank **68** of the tool **60**, it is always in a bit position between the flange **64** and the clamping ring **74** to represent the numeral "0" of the binary number that identifies the tool.

The rings **90** and **91** are arranged on the shank **68** of the tool **60** in FIG. 11 to indicate the binary number 0010010101 which may be expressed in the decimal system as number 149.

The tool **60** may be stored in a storage medium, such as the magazine **35** shown in FIG. 7, so that it can be moved past the tool selector **33** for reading the coding in the manner previously described. Therefore, the coding means affixed directly to the tool must be disposed on the tool so as to be operable to actuate the fingers **34** of selector **33** as the tool moves past it. To this end, an axial end face **75** of the collar **73** is provided with a machined surface that is cooperable with the end faces of the storage sockets **61** in the magazine **35** so as to establish the location of the machined front face **66** of the positioning flange **64** relative to the associated tool. With this arrangement the coding means will be disposed in position to actuate the selector **33** as the tool moves past it.

Referring more particularly to FIG. 12 of the drawings, there is shown a modified form of the tool coding means illustrated in FIG. 11. It will be noted that the tool illustrated is in the form of a drill **60'** which is the same type and size as the drill **60** illustrated in FIG. 11. The tool **60'** bears the identical coded information on its periphery as is presented by the removable rings **90** and grooves **90'** on the periphery of the tool **60** in FIG. 11. However, the axially spaced rings or annular radial projections **90A** are integrally formed on an enlarged diameter portion **78** of the shank **68'** on the tool **60'** adjacent to its work performing portion **69'**. Such lands or rings **90A** are produced by forming grooves **90A'** on the enlarged portion **78** of the tool **60'**. Accordingly, the lands or rings **90A** are permanently fixed on the shank **68'**, and by varying the position and relationship of the projections **90A** and grooves **90A'**, the desired code can be affixed to the tool **60'**. The rings **90A** and grooves **90A'** serve the same purpose as the removable rings **90** and grooves **90'** of the tool **60** in FIG. 11. Thus the enlarged diameter portion **60'** is provided with ten bits representing the respective ten digits of a binary number. The annular projections **90A** indicate the numeral "1" for the digit of the binary number that is represented by the bit in which the projection **90A** is located. On the other hand, a groove **90A'** in a bit on the enlarged diameter portion **78** indicates a "0" for the corresponding digit of the binary number. The axial end face **75'** of the enlarged portion **78** of the shank **68'** is likewise provided with a machined surface which serves the same purpose as the machined surface **75** of the positioning flange **64** associated with the tool **60** in FIG. 11. Thus, the machined surface **75'** will effectively retain the tool **60'** in the storage medium in position so that the integrally formed coding on the tool is disposed to actuate the tool selector as the tool **60'** moves past the selector.

FIG. 13 illustrates an end mill **80** of cylindrical form having a cylindrical shank portion **81** receivable in a working spindle of a machine and being provided with the same coding structure as the drill **60** in FIG. 11. Since the tool **80** is of a different size and type than the drill **60** shown in FIG. 11, the coding must be adapted correspondingly to identify the different tool. Accordingly, the rings **90** and **91** are arranged in such a manner as to indicate the binary code number 1000101110 which is expressed in the decimal system as number 558. The rings **90** and **91** are mounted on the tool **80** by being slid onto the periphery of a shank **81** and are secured at the predetermined location in abutting face to face relationship between the positioning flange **64** and the clamping ring **74** in the same maner as described above in connection with the tool **60** depicted in FIG. 11.

The end mill **80'** illustrated in FIG. 14 is identical to the end mill **80** shown in FIG. 13, except that it is equipped with a different coding structure. Instead of the different diameter rings **90** and **91** that slide onto the shank of the tool to form the coding as illustrated in FIG. 13, the identifying coding structure is formed integrally with the shank **81'** of the tool **80'** depicted in FIG. 14 in the same manner that the coding is formed on the shank **68'** of the drill **60'** that is shown in FIG. 12. In the embodiment illustrated in FIG. 14, axially spaced annular projections or lands **90A** are formed on an enlarged diameter portion **78'** provided on a shank **81'** of the end mill **80'**. The integrally formed coding on the end mill **80'** is provided with ten bits in accordance with the binary coding on the tool **80** shown in FIG. 13 and the lands **90A** cooperate with grooves **90A'** to form the binary coding in which the lands **90A** represent the numeral "1" of the binary number for the digit which is represented by the particular bit in which they appear. In like manner, the grooves **90A'** indicate a "0" for the binary number in the digit that is represented by the bit in which they are located on the enlarged diameter portions **78'**.

Since the end mill **80'** is the same as the end mill **80** except for the construction of the coding, the radial projections **90A** and grooves **90A'** are arranged on the tool **80'** to correspond with the arrangement of the large diameter rings **90** and the small diameter rings **91** respectively on the tool **80** shown in FIG. 13 to indicate the same binary number for identifying the tool. Accordingly, the coding on the tool **80'** in FIG. 14 represents the binary number 1000101110 which is expressed decimally as number 558. It is apparent that by varying the position and relationship of the projections **90A** and grooves **90A'** on an integrally formed coded tool, any binary code number may be produced that is capable of being produced by the removable rings **90** and **91** that are shown assembled to the tools **60** and **80** depicted in FIGS. 11 and 13 respectively.

While the present invention has been described in detail as applied in conjunction with the use of the binary coding as disclosed in the previously mentioned Brainard et al. patent, it is to be understood that such use merely affords an excellent example of its adaptability in the automatic selection of one particular tool of proper size

and type from a plurality of different sizes and types of tools.

From the foregoing detailed description of the present invention, it will readily be understood that a simple and effective means has been provided by which the selection of a particular type and size of tool may be quickly and easily accomplished from a plurality of many different types and sizes of tools.

Although the illustrative embodiment of the invention has been described in considerable detail for the purpose of disclosing a practical operative structure whereby the invention may be practiced advantageously, it is to be understood that the particular apparatus described is intended to be illustrative only and that the novel characteristics of the invention may be incorporated in other structural forms without departing from the spirit and scope of the invention as defined in the subjoined claims.

The principles of this invention having now been fully explained in connection with the foregoing description, we hereby claim as our invention:

1. In a tool bit body having a portion adapted to be gripped by a toolholder, a portion adapted to perform a work operation and a code element receiving portion:

a plurality of first code elements of uniform size and each respectively having one coded value;

a plurality of second code elements of a uniform size different than the size of said first elements with each of said second elements respectively having different coded values, said code elements being adjustably positionable on the receiving portion; and,

means for securing a predetermined number of said first and second elements to said receiving portion in selected relationship for cooperating therewith to provide a distinct configuration representing a specific coded identification equivalent to the cumulative value of said elements for identifying the associated tool.

2. A tool bit element comprising a work performing portion and a body, part of said body being adapted to be gripped by a toolholder;

a plurality of external rings mounted on the body, said rings having different outside diameters;

means for positioning said rings in various selected arrangements, each of said rings constituting one digit of a binary code structure with the size of the ring determining the value of the digit for automatically identifying the tool.

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