Nov. 18, 1958 G. A. CARLSON 2,860,457

WHEEL SPOOL ADAPTER

Filed March 5, 1956 2 Sheets-Sheet 1

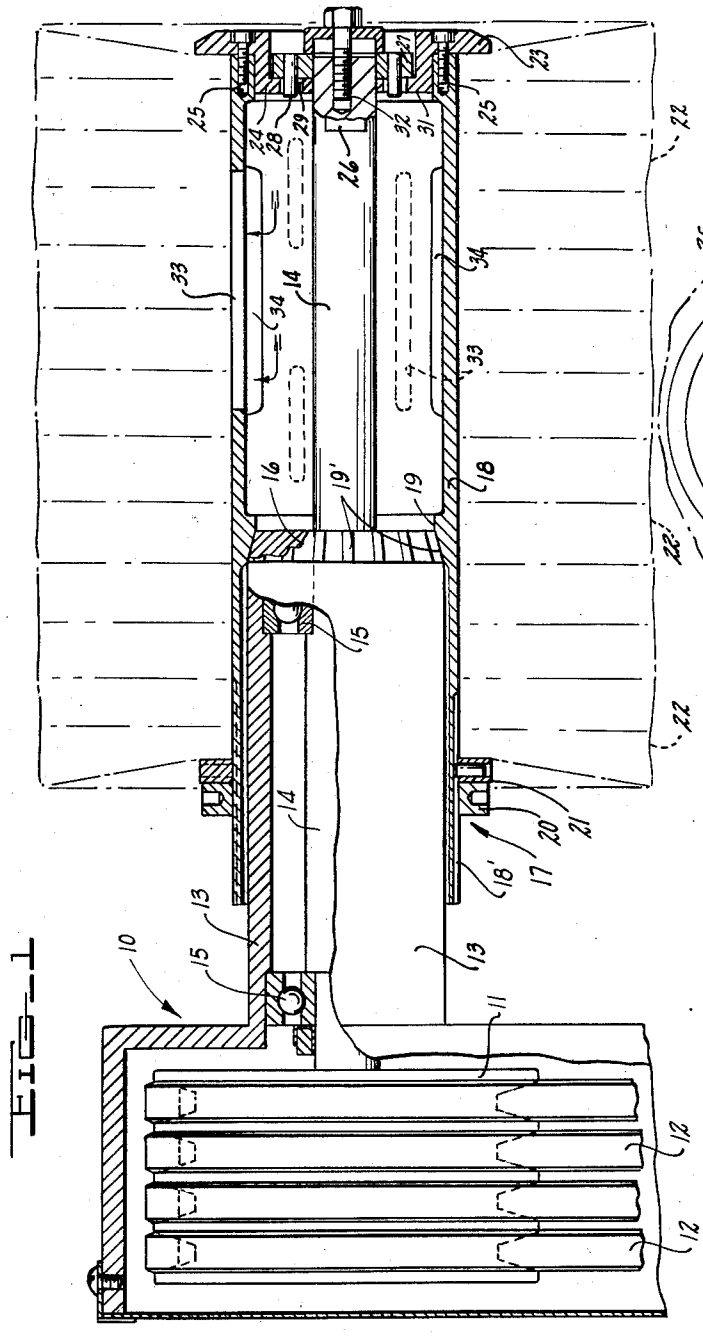


FIG. 1

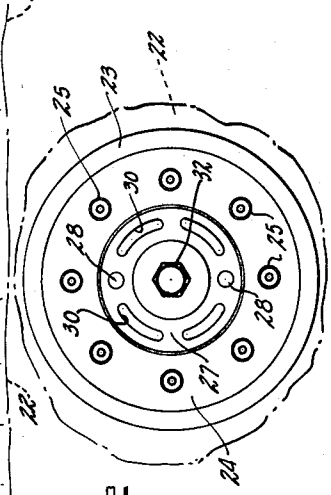


FIG. 2

INVENTOR.
GLEN A. CARLSON
BY Whittemore, Hulbert & Belknap
ATTORNEYS

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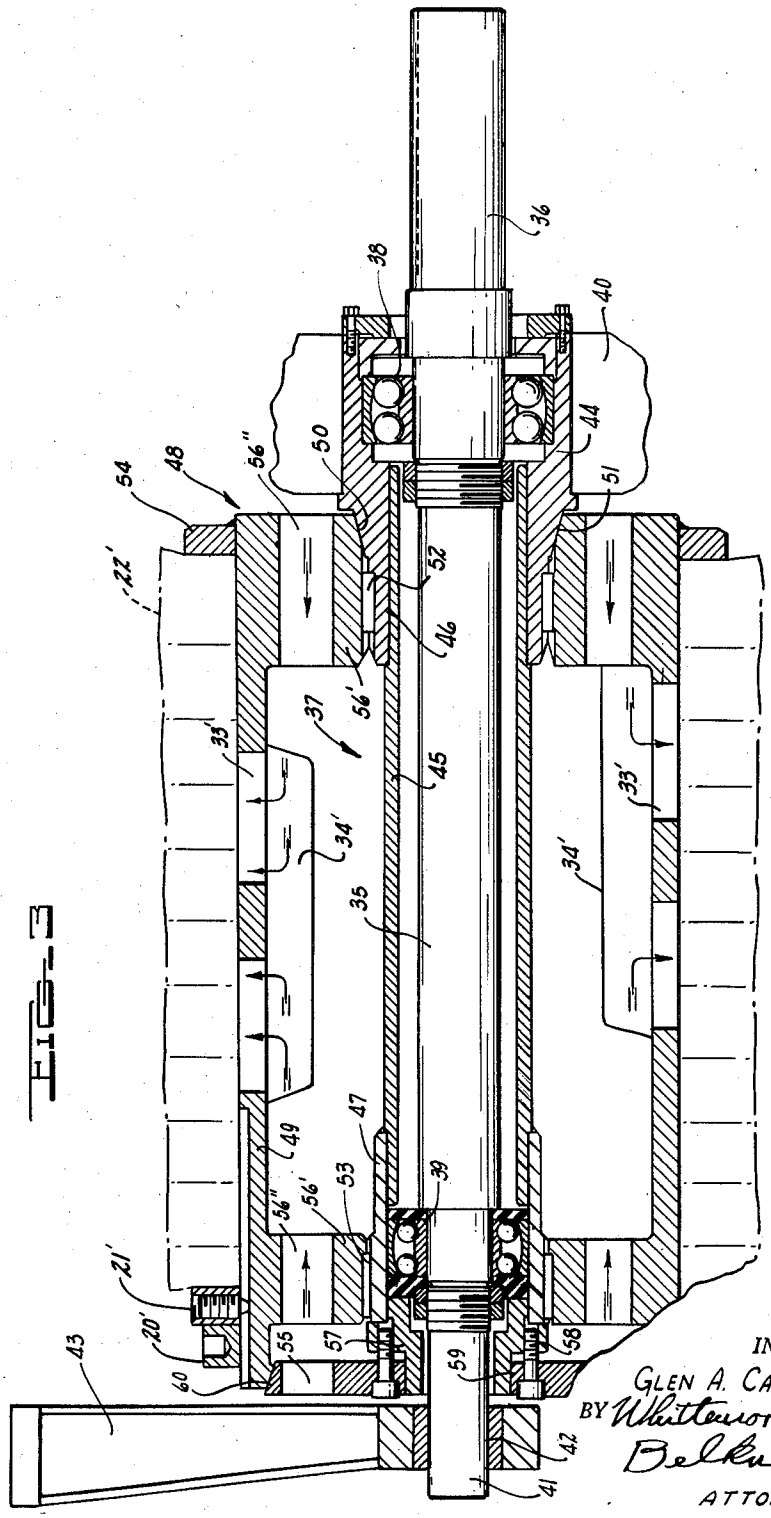


FIG. 3

INVENTOR.
GLEN A. CARLSON
BY Whittemore, Hulbert & Belknap
ATTORNEYS

United States Patent Office

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WHEEL SPOOL ADAPTER

Glen A. Carlson, Bloomfield Hills, Mich.

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16 Claims. (Cl. 51—168)

The present invention relates to improvements in industrial finishing and related machinery and, more particularly, to an improved adapter spool for a buffing, brushing or like wheel of such machinery. As incorporated in a buffing or finishing wheel, unit or head, the operation of removing and replacing a multiplicity of rotary, axially aligned and clamped fabric buffing disks, buffs or brushes upon wearing down is greatly expedited and facilitated by the spool adapter of the invention. Consequently, the time during which the machine to which the spool is applied is out of service is greatly reduced, with a corresponding reduction in hourly operating cost, and an increase in productive output is obtained.

It is a serious and time consuming drawback in the operation of conventional buffing equipment characterized by a motor and belt driven rotary spindle upon which a large number of rotary buffing or brushing disks or the like are frictionally assembled in tightly packed and clamped side by side relation to one another, that these disks or buffs must be individually slid off the spindle when worn down, and then individually replaced and clamped in the required considerable axial overall length. As the result, the equipment is down frequently for extended periods for removal and replacement of the worn components, with a complete loss of productive capacity in those periods.

It is therefore a general object of the invention to provide an improved buffing adapter spool or head unit, by which the source of loss of time referred to is eliminated. To this end, the invention provides an improved, axially elongated adapter mount of cylindrical sleeve-like character, upon which the required set of rotary finishing elements, taking standard buff disks as an example, may be preliminarily assembled and clamped, while a corresponding buffing adapter sleeve and set are in actual operation on the machine. It is a matter of a few moments duration to remove the operating head when its buffs are sufficiently reduced in diameter, and to replace this head with the standby, freshly fitted-out head, adapter head or spool.

More specifically, it is an object of the invention to provide an improved buffing spool or head of the above description, comprising a rigid mounting sleeve adapted for axial sliding, telescopic engagement over the spindle and spindle mounting structure of the existing buffing machine, and to be rigidly connected in driven relation to the rotary spindle thereof, as well as to be equally readily dismantled from the spindle structure, by a simple manipulation of a spindle engaging and coupling part of the head. The head has suitable ring and disk provisions adjacent opposite ends of its cylindrical length to clamp a multiplicity of disk buffs in place, with a desired axial adjustment and take up feature to accommodate varying numbers of buffs, and the clamping and unclamping of fresh and worn buffs on the head is performed with ease and speed.

A very important object of the invention is to provide

an improved buffing head structure of the cylindrical sleeve type, as mentioned above, in which the sleeve structure is adapted to telescope substantially in the endwise or axial direction inwardly and over the bearing structure for the existing machine spindle, so that the head of the unit is, like a spindle, well supported to resist radial flexure. The cantilever stressing action, particularly on an adapter sleeve head of substantial axial length, is thereby materially reduced, and more uniform and successful buffing and polishing result.

In accordance with one embodiment of the invention, its principles are embodied in a cantilever type unit lacking outboard end journalling support; while another embodiment, particularly designed for a very long assembly of buffs, is shown as adapted for association with a machine having an outboard spindle bearing. In either case, the advantage of stabilizing the support of the buffs on the cylindrical adapter head is present, with diminished shaft deflection, whether due to cantilever loading or intermediate loading.

It is a further object of the invention to provide an improved buffing head as described above, in which provision is made to insure a circulation of air radially through the buff assembly, as well as to reduce the weight of the assembled head and buffs and thereby further increase the ease of handling the unit in assembling and dismantling the same.

The foregoing as well as other objects of the invention will become more apparent as this description proceeds, especially in connection with the accompanying drawings, in which:

Fig. 1 is a fragmentary view, partially broken away and in axial section, illustrating a buffing head in accordance with one embodiment of the invention, as operatively assembled to the spindle and spindle mounting structure of an industrial buffing machine, the assembled buffs being indicated in dot-dash line;

Fig. 2 is a fragmentary end view from the right of Fig. 1; and

Fig. 3 is a fragmentary view in axial section through a modified embodiment of the invention.

In the embodiment of the invention illustrated in Figs. 1 and 2 of the drawings, the reference numeral **10** generally designates the belt and pulley housing of a standard industrial buffing machine, in which a multiple sheave pulley **11**, operated by motor driven endless belts **12**, is enclosed. This housing has a spindle enclosing axial extension **13**, in which a shaft or spindle **14** driven by pulley **11** is rotatably mounted by ball bearings **15** adjacent opposite extremities of the housing extension **13**. The rotatable spindle **14** is provided with a radial flange **16** of circular shape which is tapered or conical about its periphery, as shown in Fig. 1.

The improved buffing adapter head of the invention is generally designated by the reference numeral **17**; as shown in Fig. 1, it is in the form of an elongated cylindrical sleeve **18** telescoped on the housing extension **13** with a substantial radial clearance and provided with an internal annular conical shoulder intermediate its length, as at **19**. This shoulder has mating and sleeve registering or aligning engagement with the conical flange or shoulder **16** on the rotating spindle **14**. In accordance with the invention, it is contemplated that the conical flange and internal shoulder surfaces may be provided with meshing teeth or like positive drive formations, as at **19'**, in order to rotatively drive the sleeve **18** intermediate its length, as well as its outer free end, as will be described. The spaces between the formations **19'** permit axial air flow within the sleeve, to the left of the formations.

The external surface of the adapter sleeve or head **18** is smoothly cylindrical throughout substantially its

entire axial length, save for a threaded rear or inner portion 18' at the left hand end thereof, as viewed in Fig. 1, to adjustably receive a threaded locking ring 20 which holds an axially movable clamp ring 21 in clamping relation to the endmost of a series of conventional fabric or like buffing disks or buffs 22 assembled on the head 18. The clamp ring 21 may have an axially slidable splined engagement at the threaded portion 18' of the sleeve.

The opposite end of the series of buffs 22 is clampingly engaged by the radial outer flange 23 of a cupped, centrally apertured end locking disk or plate 24. This disk slides onto the outer or right hand end of the shaft or spindle 14, and is secured by screws 25 to the outer end of the sleeve head 18.

In order to drivingly couple the sleeve 18 with the spindle 14, the latter is provided with flats 26 which non-rotatively receive a driving disk 27; and the disk 27 has axially inwardly extending driving pins 28 thereon which are received in radially elongated slots 29 of the end locking plate 24. As illustrated in Fig. 2, the disk 27 is provided with one or more apertures 30 therethrough, for a purpose to be described.

A cap piece 31 is held in end abutment with the disk 27 by bolt 32 threaded in the outer end of spindle 14, thus to hold the latter in rotative driving engagement, through its pins 28, with the cupped end plate 24, hence with the adapter head or sleeve 18. It is seen that the latter may be easily and quickly slipped off the spindle 14 by simply removing bolt 32 and cap 31, and as readily replaced when a set of worn buffs 22 has been removed and fresh buffs substituted on the sleeve 18. As indicated above, the adjustable setting of the end clamp ring 21 enables any desired number of disks to be mounted, and this operation is performed quickly and easily, while the buffing machine is in operation using a replacement adapter head 17.

In the interest of increased lightness in weight, as well as to afford means to circulate air through the buffs 22, the sleeve 18 is preferably provided with a plurality of circumferentially distributed vent apertures or slots 33, and it will be appreciated that the centrifugal effect will cause air to be drawn axially through the end plate air entry apertures 30 (Fig. 2), thence radially through the slots 33 for the desired circulation. Vane-like impellers 34 are formed integrally on the interior of sleeve 18 adjacent the ventilating slots 33 to increase the volume and rate of air flow. These provisions keep the buffs 22 cool and prevent possibility of their burning the surface polished.

By reference to Fig. 1 it will be noted that the use of the improved buffing head 17, as it is telescoped over the housing extension 13, brings the mount for the buffing head assembly inwardly over a substantial portion, at least, of the extension, in which the spindle is journalled by bearings 15. This greatly stabilizes the construction against radial deflection, by substantially decreasing the unsustained cantilever length of the rotating assembly. As in the other embodiment of the invention, to be described, this is one of the improvement objectives and advantages secured by the improvement.

Referring to the embodiment shown in Fig. 3, it differs from that of Figs. 1 and 2 in that the longitudinally extending spindle 35 thereof is a rotatively fixed one. However, to the extent that the two forms have corresponding structural features or relationships, such features will be designated in Fig. 3 by corresponding reference numerals, primed.

The spindle 35 is fixedly secured, as by a splined inner or rear extension 36, to a suitable rigid support on the buffing machine (not shown). A rotatable housing structure, generally designated 37, which surrounds and is rotatably supported by the spindle 35, is journalled on the latter by self-aligning ball bearings 38, 39 adjacent its rear and front ends, respectively; and this housing structure is rotatively driven by the buffing machine, as by connected pulley or the like, designated 40.

As shown in Fig. 3, the fixed spindle 35 is sustained at an outer reduced end portion 41 thereof in a bushing 42 of an outboard supporting arm 43, which is axially and/or rotatively adjustable to align with and receive the spindle end 41.

Appropriate dust seals and holding provisions therefor are associated between the spindle 35 and rotatable sleeve structure 37, with which the invention is not concerned.

The sleeve structure comprises the inner or rear housing member 44, of tubular cross section, to which the outer race of rear bearing 38 is secured, an elongated cylindrical housing sleeve 45 which is telescoped in and rigidly secured to a forward tubular nose portion 46 of housing member 44; and a forward tubular housing member 47, in which the forward or outer end of the housing sleeve 45 is received and rigidly secured. The outer race of the forward ball bearing 39 is carried by the forward housing member 47. This affords an annular rotatable housing structure 37 which is will supported along its length, as is the improved adapter head or sleeve, generally designated 48, of the invention, which is removably mounted on the housing structure 37 for rotation therewith.

As shown in Fig. 3, the head 48 comprises an elongated sleeve 49, apertured for air circulation as discussed in connection with Figs. 1 and 2, which sleeve has a conical inner surface 50 at its rear or inner end in mating engagement with a conical surface 51 on the housing member 44. The sleeve 49 and member 44 have a splined driving engagement at 52. Adjacent the forward end of the sleeve 49, the latter has a similar splined driving engagement at 53 with the forward housing member 47 of the rotatable housing structure 37.

A stop ring or washer 54 is welded on the inner or rear extremity of the buff-mounting sleeve 49, against which the series of buffs abuts and is clamped, while the opposite end of sleeve 49 has provisions similar to those of Fig. 1 for adjustably receiving a clamp ring or washer 21' and a locking ring or nut 20'.

The outer end disk structure 56 of the form of Fig. 3 will be axially apertured at 55 for admission of air, as in the previous form, and opposed end walls 56' of the sleeve 49, at which it is splined to the housing structure 37, have air intake openings 56'' for the inflow of air to the ventilating slots 33.

As illustrated in Fig. 3, the disk structure 56 comprises a centrally apertured, radially and axially flanged end clamping ring member 57 which is suitably secured to the adjacent end of the housing member 47 of the rotating housing structure 37, as by circumferentially extending screws or bolts (not shown). The member 57 is tapped to receive lock screws 58, which releasably hold in place the end locking ring 59. Ring 59 has a conical outer surface 60 which mates with a corresponding inner conical surface at the end of sleeve 49.

It is believed that the operation of the improved head, in either of its adaptations, will be understood from the foregoing description. The respective head sleeves 18, 49 are quickly and easily detachable from the structure mounting the same for rotation, which is the rotatable spindle 14 in the embodiment of Fig. 1 and the rotatable housing structure 37 in the other embodiment. This involves simply the removal of bolt 32 and end clamp member 31, in the form of Figs. 1 and 2, to enable the head 17 to be slipped off its rotative support; while in the form of Fig. 3 it is only necessary to remove the outboard support 43 and release clamp ring 59. A set of buffs 22 or 22' previously assembled and clamped on a replacement head 17 or 48 is then slipped in place on the rotative support and locked in driven relation to the latter.

It will be appreciated that the improvement has great value, particularly in an embodiment like that of Fig. 1, in which a rotating spindle structure is unsupported at one end and sustains a cantilever load. The improvement greatly reduces this load by permitting a substantial telescoping or overlapping of the buff assembly over the axial zone, along which the buffs are well sustained. The constantly changing radial stress on a rotating spindle loaded at one side only is far better accommodated than in an installation lacking the improvement. A fixed spindle installation (Fig. 3) is also better sustained.

If desired, the adapter heads may be fabricated of a light weight metal, such as aluminum, for ease in handling, however, the number, size and distribution of the air circulating openings 33, 33' therein will substantially reduce weight, if this is not desired.

Moreover, it is to be understood that references above to the adaptation of the invention to a buffing wheel adapter or head are merely illustrative. The principles of the invention have wider utility in various types of material finishing equipment, of which buffing, brushing and other types of finishing wheels are simply illustrative components.

What I claim as my invention is:

1. An adapter spool head for a finishing machine characterized by coaxial, relatively rotatable and axially telescoped inner spindle and outer housing parts having interposed bearing means rotatably mounting the one on the other, said head comprising a rigid cylindrical sleeve open at one end, said sleeve being dimensioned to be telescoped onto said housing part and being of substantial length sufficient to drivingly receive a plurality of finishing disks in an axially extending, side by side series, external annular abutments adjacent the ends of said sleeve between which the ends of said series may be clamped, one of said abutments being axially adjustable on said sleeve, internal abutment means to axially engage said sleeve with the relatively rotatable part at a point spaced substantially from the end of the housing part onto which the sleeve is telescoped, and means to drivingly connect said sleeve with said relatively rotatable part at the end thereof opposite its open end.

2. An adapter head for a buffing or like finishing machine characterized by coaxial, axially telescoped inner rotatable spindle and outer fixed housing parts having interposed bearing means rotatably mounting the spindle part on the housing part, said head comprising a rigid cylindrical sleeve open at one end, said sleeve being dimensioned to be telescoped onto said housing part and being of substantial length sufficient to drivingly receive a plurality of buffing disks in an axially extending, side by side series, external annular abutments adjacent the ends of said sleeve between which the ends of said series may be clamped, one of said abutments being axially adjustable on said sleeve, internal abutment means to axially engage said sleeve intermediate the length thereof with the rotatable spindle part at a point spaced substantially from the open telescoping end of the sleeve, and with a substantial axial overhang of said sleeve in relation to said bearing means, and means to drivingly connect said sleeve with said rotatable spindle part at the opposite end thereof.

3. An adapter head for a buffing machine characterized by coaxial, axially telescoped inner fixed spindle and outer rotatable housing parts having interposed bearing means rotatably mounting the housing part on the spindle part, said head comprising a rigid cylindrical sleeve open at one end, said sleeve being dimensioned to be telescoped onto said housing part and being of substantial length sufficient to drivingly receive a plurality of buffing disks in an axially extending, side by side series, external annular abutments adjacent the ends of said sleeve between which the ends of said series may be clamped, one of said abutments being axially adjustable on said sleeve, internal abutment means to axially engage said sleeve with the rotatable housing part at a point spaced substantially from the end of the housing part onto which the sleeve is telescoped, and means to drivingly connect said sleeve with said rotatable housing part at the end thereof opposite its open end.

4. An adapter head in accordance with claim 1 in which said sleeve is apertured to provide radial air circulation therethrough and said finishing disks being buffing disks axially between and radially through which the air is circulated.

5. An adapter head in accordance with claim 1, in which said sleeve is apertured to provide radial air circulation therethrough and said finishing disks being buffing disks axially between and radially through which the air is circulated, said connecting means comprising an end plate coupling the sleeve and relatively rotatable part and apertured for admission of air to the sleeve.

6. An adapter head in accordance with claim 2, in which said sleeve is apertured to provide radial air circulation therethrough.

7. An adapter head in accordance with claim 3, in which said sleeve is apertured to provide radial air circulation therethrough.

8. In combination with finishing machine structure having coaxial, axially telescoped and relatively rotatable inner spindle and outer housing parts, and bearing means mounting the same for relative rotation, a rigid rotatable cylindrical sleeve open at an inner end and dimensioned to be axially telescoped a substantial distance on said housing part, said sleeve being of axial length sufficient to drivingly receive a plurality of finishing disks in an axially extending, side by side series, and in a zone substantially overlapping said bearing means axially, means to secure said disks on said sleeve, and means removably mounting said sleeve on the relatively rotative part for rotation therewith.

9. In combination with finishing machine structure having coaxial, axially telescoped and relatively rotatable inner spindle and outer housing parts, and bearing means mounting the same for relative rotation, a rigid rotatable cylindrical sleeve open at an inner end and dimensioned to be axially telescoped a substantial distance on said housing part, said sleeve being of axial length sufficient to drivingly receive a plurality of finishing disks in an axially extending, side by side series, and in a zone substantially overlapping said bearing means axially, means to secure said disks on said sleeve, and means removably mounting said sleeve on the relatively rotative part for rotation therewith, the inner open end of said sleeve as so mounted being spaced axially inwardly a substantial distance in relation to said bearing means.

10. In combination with finishing machine structure having coaxial, axially telescoped, rotatable inner spindle and fixed outer housing parts, and bearing means mounting the same for relative rotation, a rigid rotatable cylindrical sleeve open at an inner end and dimensioned to be axially telescoped a substantial distance on said fixed housing part, said sleeve being of axial length sufficient to drivingly receive a plurality of finishing disks in an axially extending, side by side series, and in a zone substantially overlapping said bearing means axially, means to secure said disks on said sleeve, and means removably mounting said sleeve on the fixed housing part for rotation therewith.

11. In combination with finishing machine structure having coaxial, axially telescoped, rotatable inner spindle and fixed outer housing parts, and bearing means mounting the same for relative rotation, a rigid rotatable cylindrical sleeve open at an inner end and dimensioned to be axially telescoped a substantial distance on said fixed housing part, said sleeve being of axial length sufficient to drivingly receive a plurality of finishing disks in an axially extending, side by side series, and in a zone substantially overlapping said bearing means axially, means to secure said disks on said sleeve, and means removably

mounting said sleeve on the fixed housing part for rotation therewith, the inner open end of said sleeve as so mounted being spaced axially inwardly a substantial distance in relation to said bearing means.

12. In combination with finishing machine structure having coaxial, axially telescoped, fixed inner spindle and rotatable outer housing parts, and bearing means mounting the same for relative rotation, a rigid rotatable cylindrical sleeve open at an inner end and dimensioned to be axially telescoped a substantial distance on said rotatable housing part, said sleeve being of axial length sufficient to drivingly receive a plurality of finishing disks in an axially extending, side by side series, and in a zone substantially overlapping said bearing means axially, means to secure said disks on said sleeve, and means removably mounting said sleeve on the rotatable housing part for rotation therewith.

13. In combination with finishing machine structure having coaxial, axially telescoped, fixed inner spindle and rotatable outer housing parts, and bearing means mounting the same for relative rotation, a rigid rotatable cylindrical sleeve open at an inner end and dimensioned to be axially telescoped a substantial distance on said rotatable housing part, said sleeve being of axial length sufficient to drivingly receive a plurality of finishing disks in an axially extending, side by side series, and in a zone substantially overlapping said bearing means axially, means to secure said disks on said sleeve, and means removably mounting said sleeve on the rotatable housing part for rotation therewith, the inner open end of said sleeve as so mounted being spaced axially inwardly a substantial distance in relation to said bearing means.

14. In combination with finishing machine structure having coaxial, axially telescoped and relatively rotatable inner spindle and outer housing parts, and bearing means mounting the same for relative rotation, a rigid rotatable cylindrical sleeve open at an inner end and dimensioned to be axially telescoped a substantial distance on said housing part, said sleeve being of axial length sufficient to drivingly receive a plurality of finishing disks in an axially extending, side by side series, and in a zone substantially overlapping said bearing means axially, means to secure said disks on said sleeve, and means removably mounting said sleeve on the relatively rotative part for rotation therewith, the inner open end of said sleeve as so mounted being spaced axially inwardly a substantial distance in relation to said bearing means, said finishing disks being of a character to permit air flow therethrough radially relative to the series thereof and said sleeve being radially apertured for air circulation from at least one end thereof.

15. In combination with finishing machine structure having coaxial, axially telescoped, rotatable inner spindle and fixed outer housing parts, and bearing means mounting the same for relative rotation, a rigid rotatable cylindrical sleeve open at an inner end and dimensioned to be axially telescoped a substantial distance on said fixed housing part, said sleeve being of axial length sufficient to drivingly receive a plurality of finishing disks in an axially extending, side by side series, and in a zone substantially overlapping said bearing means axially, means to secure said disks on said sleeve, and means removably mounting said sleeve on the fixed housing part for rotation therewith, the inner open end of said sleeve as so mounted being spaced axially inwardly a substantial distance in relation to said bearing means, said finishing disks being of a character to permit air flow therethrough radially relative to the series thereof and said sleeve being radially apertured for air circulation from at least one end thereof.

16. In combination with finishing machine structure having coaxial, axially telescoped, fixed inner spindle and rotatable outer housing parts, and bearing means mounting the same for relative rotation, a rigid rotatable cylindrical sleeve open at an inner end and dimensioned to be axially telescoped a substantial distance on said rotatable housing part, said sleeve being of axial length sufficient to drivingly receive a plurality of finishing disks in an axially extending, side by side series, and in a zone substantially overlapping said bearing means axially, means to secure said disks on said sleeve, and means removably mounting said sleeve on the rotatable housing part for rotation therewith, the inner open end of said sleeve as so mounted being spaced axially inwardly a substantial distance in relation to said bearing means, said finishing disks being of a character to permit air flow therethrough radially relative to the series thereof and said sleeve being radially apertured for air circulation from at least one end thereof.

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