Feb. 7, 1967 J. J. KEYSER 3,302,899

SPINNING OR TWISTING SPINDLE

Filed July 24, 1964

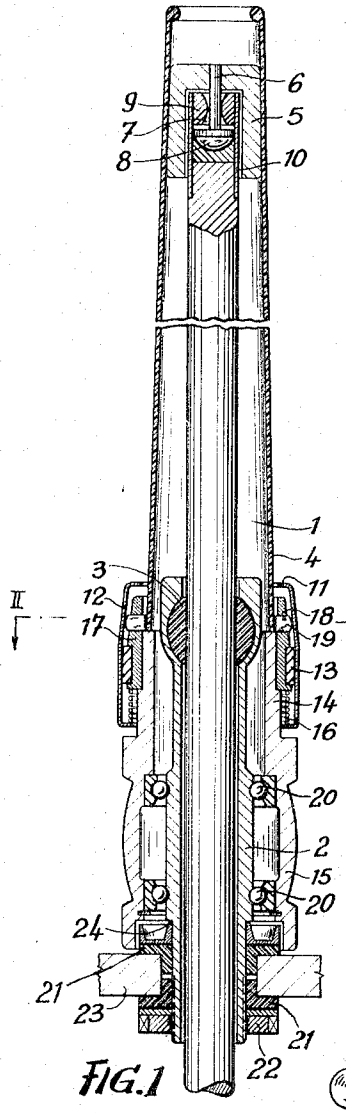

FIG. 1

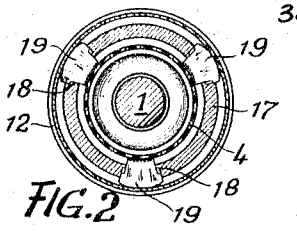

FIG. 2

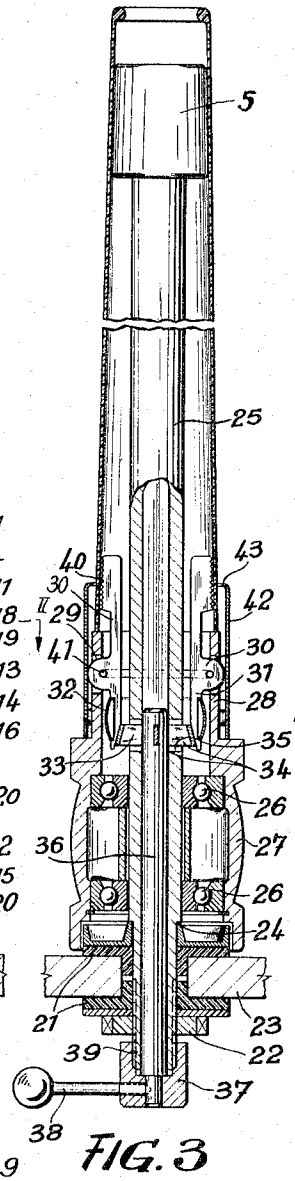

FIG. 3

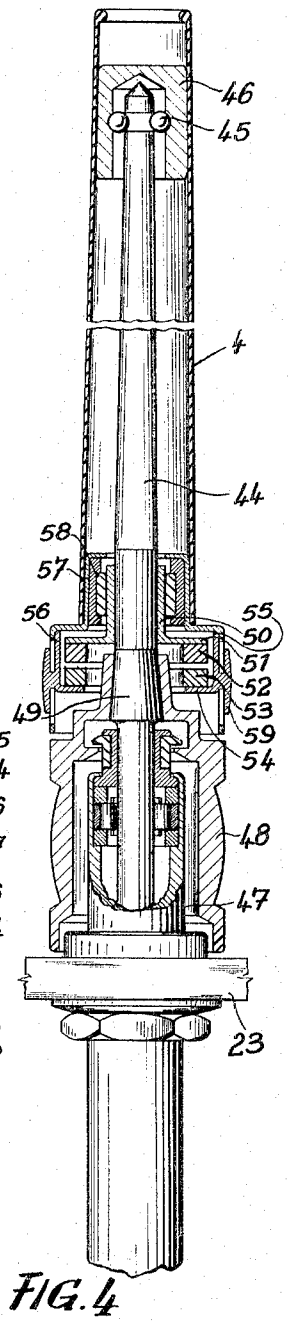

FIG. 4

United States Patent Office

3,302,899

Patented Feb. 7, 1967

3,302,899

SPINNING OR TWISTING SPINDLE

Johann Jacob Keyser, Grabenalle 16,
Aarau, Switzerland

Filed July 24, 1964, Ser. No. 384,905
Claims priority, application Germany, July 30, 1963,
K 50,383
8 Claims. (Cl. 242—46.4)

The present invention concerns a spinning or twisting spindle. With spinning and twisting machines the spindles of which are driven by a central driving unit, it is known, through the intervention of belts and/or transmissions, to bring about a braking or stopping of each individual spindle. The heretofore known brakes and stopping devices are so designed that the spindle may, together with the cop thereon, be braked and stopped as a unit, whereas the driving means which are coupled to the spindle during the operation thereof, may continue to rotate.

With spindle drives employing a whorl, the whorl is disengaged from the spindle shank while simultaneously brake shoes engage the part to be braked and stop the same. Particularly, the braking of the yarn body or cop is effected manually after the spindle as an entirety has been disengaged from the driving means therefor.

With heretofore known braking and stopping devices, it is disadvantageous that a relatively large mass has to be braked and stopped. This mass comprises the yarn body, viz. the bobbin or the sleeve with or without the yarns, and furthermore, the spindle or a considerable portion thereof.

It is, therefore, an object of the present invention to provide a spinning or twisting spindle in which of all rotating parts, exclusively the yarn body is braked.

It is another object of this invention to provide means in connection with spinning or twisting spindles which, with certain spindle designs will keep the mass of the rotating parts to a minimum so that the required driving forces may be kept correspondingly small.

These and other objects and advantages of the invention will appear more clearly from the following specification in connection with the accompanying drawing, in which:

FIGURE 1 diagrammatically illustrates in section a spinning spindle with stationary spindle shank and with a disengageable clutch adapted to engage the outside of the yarn body bobbin;

FIGURE 2 is a cross-section through the spindle according to FIGURE 1 within the range of the disengageable clutch and along II—II of FIG. 1;

FIGURE 3 represents a longitudinal section through a spinning spindle with stationary spindle shank and with a disengageable clutch adapted to engage the yarn body bobbin from the inside;

FIGURE 4 is a spinning spindle with driven spindle shank and with disengageable clutch.

The present invention is based on a spinning or twisting spindle in which the upper end of the spindle shank carries a freely rotatable supporting body for the bobbin to be placed thereon. Such a spindle shank may rotate with the driving whorl or may be arranged stationarily. In the last-mentioned instance, the bobbin has its upper end resting on the freely rotatable supporting body, whereas its lower end is placed upon the rotating whorl or parts connected thereto. Such an arrangement is disclosed, for instance, in German Patent No. 1,126,785.

In order to realize that only the bobbin which rests upon the spindle shank and is rotatable relative thereto by means of the supporting body arranged at the upper end thereof may be braked alone and be stopped, in conformity with the present invention and within the

range of the lower end of the bobbin, there is provided a disengageable clutch which, when engaging the bobbin, couples the same with the driving whorl. Thus, it is made certain that by disengaging the said clutch, the bobbin will be detached from the driving whorl, which means it will no longer be driven so that its rotation slows down and the bobbin will be brought to a standstill.

Referring now to the drawing in detail, and FIGS. 1 and 2 thereof in particular, with the spinning spindle illustrated therein, the spindle shank 1 is stationary. As will be seen from the drawing, spindle shank 1 passes with play through the bearing sleeve 2 and is held by a ball cup body 3 of elastic material as, for instance, an ethyleneglycol adipic acid polyester in combination with naphthylene-1,5-diisocyanate (trademark "Vulcollan"). Depending on the length of the yarn body bobbin 4, spindle shank 1 may be raised to a greater or less extent. The upper end of spindle shank 1 carries a freely rotatable cup-shaped supporting member 5. This supporting member 5 is adapted to rotate together with the connecting pin 6 which latter extends through a bore 7 with arched wall surfaces and is by a head 8 prevented from lifting off. Around the bearing body 9 provided with bore 7 there extends a sleeve 10 by means of which the connection of the bearing body 9 with the upper end of spindle shank 1 is established. Supporting body 5 is adapted freely to rotate and is also adapted, to a limited extent, to carry out tumbler movements so that the yarn body bobbin 4 can be axially mounted in such a way that it will engage the disengageable clutch at the driving whorl, to the required extent.

According to a further development of the present invention, the lower end of the yarn body bobbin may rest on the upper end face of a sleeve forming an upward extension of whorl 15, and the disengageable clutch may consist of clutch shoes which, from the outside, engage the yarn body bobbin and are guided in the sleeve while having their outer ends resting against the inner surface of an axially displaceable conical sleeve freely rotatably journalled on the whorl sleeve. With such a spinning or twisting spindle, the yarn body is rotated by the clutch jaws resting on the yarn body and pertaining to the disengageable clutch. For purposes of disengagement, the conical sleeve is axially displaced to such an extent that the clutch jaws may radially move outwardly. This movement is effected automatically due to the centrifugal force, so that automatically with the axial displacement of the conical sleeve, there will be obtained a disengagement so that the yarn body bobbin will no longer be driven and will come to a standstill. The clutch position may, for instance, be arrested by a spring, magnets, the weight of the conical sleeve or the like, so that the displacement of the conical sleeve must overcome these forces while on the other hand, the coupling operation will be effected automatically.

More specifically, with regard to FIG. 1 of the drawing, when being mounted, the yarn body bobbin 4 surrounds, with a certain play, the upper end of bearing sleeve 2. The inwardly extending flange 11 of a conical sleeve 12 surrounds the lower end of the yarn body bobbin 4. The said conical sleeve 12 is by means of an anti-friction bearing 13 freely rotatably journalled on an extension sleeve 14 of the driving whorl 15. Sleeve 12 is displaceable axially upwardly against the thrust of a spring 16 which tends to press sleeve 12 downwardly as far as possible. FIG. 1 shows a sleeve 12 in this position. The upper end of the extension sleeve 14 of whorl 15 has connected thereto the inner ring 17 of the anti-friction bearing 13. This inner-ring is firmly mounted upon the extension sleeve 14 of whorl 15 and forms, so-to-speak, a unit with said sleeve. Distributed over the circumfer-

ence of inner ring 17 are three passages 18 in which radially displaceable clutch jaws 19 are mounted. In view of the conical shape of sleeve 12, it will be appreciated that when the latter occupies its lowermost position, the clutch jaws 19 are pressed radially inwardly against the lower end of the bobbin 4 which rests at its lower end upon the upper end face of extension sleeve 14. This position is also shown in FIG. 2. When the conical sleeve 12 is displaced upwardly against the thrust of spring 16, the clutch jaws 19 are adapted to disengage themselves radially in conformity with the conical shape of sleeve 12, so that its contact with the lower end of bobbin 4 will cease. This disengagement is effected automatically due to the centrifugal force which becomes effective in view of the rotation of whorl 15, which latter permits the clutch jaws 19 likewise to rotate. As a result thereof, the lower end of bobbin 4 is released, and yarn body bobbin 4 will be stopped. The radial movability of clutch jaws 19 brings about the further advantage that it automatically compensates for diameter tolerances of the yarn body bobbin 4 to be mounted.

Whorl 15 is, in customary manner by means of anti-friction bearings 20, journalled on bearing sleeve 2 which in its turn is connected to the spindle rail 23 by means of sleeves 21, a supporting shoulder 24 on sleeve 2 and a nut 22 threadedly engaging sleeve 2.

According to a modification of the present invention, the lower edge portion of the yarn body bobbin may likewise rest on the upper end face of a sleeve extension of the whorl, and a disengageable clutch may be provided which is composed of a plurality of two-arm tiltable levers journalled on the whorl extension sleeve. Said tiltable levers are arranged between the whorl extension sleeve and the spindle shank, and the upper clutch arms are adapted selectively to engage the yarn body bobbin from the inside for rotating said bobbin or to disengage said bobbin to interrupt the drive therefor. In this way, it is likewise necessary merely to stop the cop.

An arrangement of the type just referred to is more specifically shown in FIG. 3. The arrangement according to FIG. 3 likewise comprises a stationary spindle shank 25 which is connected to the spindle rail 23 by means of sleevess 21 similar to the arrangement of FIG. 1. There is also provided a nut 22 similar to the arrangement of FIG. 1 and there is furthermore provided a supporting shoulder 24 on the spindle shank 25 so that the spindle shank 25 is firmly stationarily held.

Mounted on spindle shank 25 are anti-friction bearings 26 rotatably journalling the driving whorl 27 which latter similar to whorl 15 of FIG. 1 has an upwardly directed extension 28. The upper end of the extension or extension sleeve 28 is provided with slots 29 in which tiltable levers 30 are pivotally journalled. In order to assure that the radial outward tilting of the lower arms of the tiltable levers 30 will be effected uniformly and practically free from play, it is advantageous in conformity with the present invention to provide springs between the outside of the lower lever arms and the inner surface of the whorl extension sleeve 28 so that the outward movement of said lower lever arms is effected against the thrust of said springs. As will be seen from FIG. 3, the lower lever arm 31 of each tiltable lever 30 has a leaf spring 32 on the outside thereof. The lower lever arm of each of said levers has its inner surface in engagement with the outer surface of a ring 33 carried by radially directed arms 34 which extend through longitudinal slots 35 in a spindle shank 25. These arms are carried by an adjusting shank 36 which extends through the spindle shank 25 in axial direction thereof and is adjustable as to height. For purposes of adjusting the said adjusting shank 36, the lower end of shank 25 is provided with a thread 39 threadedly engaged by a threaded cap 37 which has an actuating or tilting lever 38. It will be appreciated that turning lever 38 in a horizontal plane with regard to

FIG. 3 will bring about an axial displacement of the adjusting shank 36. When adjusting shank 36 is displaced axially upwardly, the outer or peripheral surface of ring 33 moves the lower lever arms 31 of tilting levers 30 outwardly so that the upper clutch arms 40 of the tilting levers 30 will be tilted radially inwardly. When the adjusting shank 36 is not in its upper or lever tilting position, the upper clutch arms 40 of the tilting levers 30 engage the yarn body bobbin 4 from the inside. This engagement is brought about by centrifugal force and the fact that the yarn body bobbin 4 is being rotated by the whorl 27.

In order to facilitate the placing of the yarn body bobbin upon the upper clutch arms of the tiltable levers for turning the yarn body bobbin, it is advantageous to allow the clutch arms of the tiltable levers to engage the inner surface of said bobbin only when the whorl rotates. In order to bring this about automatically, according to a further development of the present invention, the center of gravity of the tiltable levers is located above the pivotal supporting points of said tiltable levers so that when said levers are rotating, the centrifugal force will automatically press the upper clutch arms of the tiltable levers outwardly and thus will bring about a rotation of the yarn body bobbin. More specifically, the center of gravity of said tiltable levers 30 is located above the tilting points of levers 30.

When the adjusting shank 36 is axially displaced downwardly, the lower lever arms 31 of the tilting levers 33 will be freed and accordingly, are able to tilt radially inwardly which, in turn, brings about a radially outward tilting of the upper clutch arms 40.

When whorl 27 is at a standstill and the bobbin 4 is being placed on the spindle, springs 32 will assure that the upper clutch arms 40 will occupy such a position that bobbin 4 can be fully placed upon the spindle. A movement of bobbin 4 toward the outside is limited by a sleeve 42 the upper portion 43 of which is somewhat flanged inwardly. Sleeve 42 surrounds in spaced relationship the extension sleeve 28 of drive whorl 27 and covers slots 29 toward the outside, thereby protecting the same against soiling. Similar to spindle shank 1 of FIG. 1, the upper end of the stationary spindle shank 25 carries a freely rotatable supporting body 5 which is of the same type as described in connection with the arrangement of FIGS. 1 and 2. This supporting body 5 may also be designed in conformity with an arrangement which will be described in connection with FIG. 4.

While the present invention has been described so far in connection with a stationary spindle, it is to be understood that the arrangement according to the invention is by no means limited thereto. Expressed differently, the invention may also be realized by having the lower end of the yarn body bobbin placeable upon a sleeve freely rotatably mounted on a driven spindle part. Such freely rotatable sleeve may widen at its lower end to form an open pot on which a further sleeve is axially displaceable, said last-mentioned sleeve being at the inside thereof equipped with a multi-pole magnet facing thereabove a multi-pole magnet which rotates with a driven spindle part. Such an arrangement brings about that the bobbin is freely rotatable on the rotating spindle part. The bobbin is rotated by said spindle part by the magnet supported by the freely rotatable sleeve. This magnet is rotated by the magnet rotated by the spindle part so that at the same time also that sleeve will rotate which is drivingly connected to the yarn body bobbin, and thus is likewise rotated. Inasmuch as that magnet which is carried by the sleeve broadening out in a pot-shaped manner, may be displaced axially, this magnet can easily be axially moved by the magnet carried by the driven spindle part, and this axial movement may be such that the magnetic field will be interrupted. In this way, the bobin is separated from the driven spindle part and can be braked independently therefrom. In this instance, the disengageable clutch is

formed by two oppositely located magnets one of which is movable away from the other. If the moved-away magnet is again moved toward the rotating magnet, it will again be carried around, i.e. rotated by the magnetic force so that also the sleeve carrying said last-mentioned magnet will be rotated and consequently, the bobbin on said last-mentioned sleeve.

An arrangement of this type is shown in FIG. 4 according to which the upper end of spindle shank **44** has arranged thereon an anti-friction bearing **45** around which the cup-shaped supporting body **46** can rotate. The supporting body **46** is at the same time able to carry out slight pendulum movements, as they have been referred to in connection with the description of FIG. 1.

In contrast to the embodiments of FIGS. 1 and 2, the arrangement of FIG. 4 comprises a driven spindle shank **44** relative to which the supporting body **46** may be at a standstill. The lower end of spindle shank **44** is in customary manner journalled in a spindle housing generally designated **47** which in its turn is connected to the spindle rail **23**. The driving whorl **48** surrounds the outside of the spindle housing **47**. The upper end of whorl **48** is placed directly upon the conical section **49** of spindle shank **44** so as to rotate the latter. Above the conical section **49**, a sleeve **50** with flange **51** is slipped over spindle shank **44** for rotation with shank **44**. The bottom side of flange **51** carries a multi-pole annular magnet **52** facing a multi-pole ring magnet **53**. Ring magnet **53** is carried by a flange **54** of a sleeve **55** which is axially displaceably arranged in pot **56**. Pot **56** forms a downwardly open wider section of sleeve **57** which by means of an antifriction bearing **58** is freely rotatably journalled on sleeve **50**. For purposes of axial displacement of sleeve **55**, the latter is provided with a handling ring **59**.

When sleeve **55** with magnet **53** occupies the position illustrated in FIG. 4, magnet **52**, when rotating, will, while being driven by spindle shank **44**, also rotate magnet **53** while sleeve **57** is rotated by sleeve **55** carrying magnet **53**. Bobbin **4** is placed on sleeve **57** so that also bobbin **4** will rotate, and whorl **48**, spindle shank **44**, and bobbin **4** will rotate together.

When sleeve **55** is axially displaced downwardly by means of ring **59**, magnet **53** moves away from magnet **52** eventually to such an extent that the existing magnetic field will be interrupted or weakened to such an extent that magnet **53** will no longer be rotated. In this way, sleeve **57** carrying the bobbin **4** is disengaged from driven spindle shank **44** so that bobbin **4** or the cop carried thereby will come to a standstill. By again displacing sleeve **55** upwardly by means of ring **59**, the two magnets **53** and **52** again approach each other so that the axially displaceable magnet will be carried around or turned by the magnet connected to the spindle shank **44** so that the yarn body bobbin **4** will again be rotated.

From the above, it will be appreciated that all embodiments described herein have in common the feature that the yarn body bobbin **4** is freely rotatably journalled on the spindle shank. Bobbin **4** is rotated by the driving whorl by means of a clutch engaging the yarn body bobbin either from the inside or from the outside. The clutch is adapted by axial displacement of an actuating member to be engaged or disengaged and its engagement may be effected automatically by force of springs, or the like. The invention, therefore, realizes the object that the yarn body bobbin also may be braked and stopped without the necessity of having to brake other rotating parts of the spindle in order to stop the cop. Furthermore, the power requirement for again starting or rotating the bobbin after the latter had been stopped is less than with heretofore known spindles because the bobbin or cop alone has to be put into motion. In this connection, it is of particular advantage that the clutch may remain in its engaged or disengaged position for any desired length without other parts frictionally engaging each other, as is the case with heretofore known spindles.

It is, of course, to be understood that the present invention is, by no means limited to the particular arrangement shown in the drawings, but also comprises any modifications within the scope of the appended claims. Thus, if desired, the clutches of the individual embodiments described above may be interchanged, to which end only minor structural changes are necessary in order to adapt the individual elements to each other.

What I claim is:

1. In combination with a bobbin having an upper and a lower portion; a textile spindle having a spindle shank, bobbin supporting body means freely rotatably supported by said spindle shank and supporting said bobbin, whorl means coaxially surrounding said shank and adapted to be drivingly connected to driving means, clutch means operatively disposed between said whorl means and the lower portion of said bobbin and adapted to establish and interrupt driving connection of said whorl means, a member associated with said clutch means having a first position wheerin said clutch means is effective to establish said driving connection and a second position wherein said clutch means is ineffective to establish said driving connection, and means connected to said member for moving said member between its said first and second positions, said means being selectively operable during continued rotation of said whorl means to permit said bobbin to be halted and removed from said bobbin supporting body means and replaced by a new bobbin and the said new bobbin set into motion.

2. The combination according to claim **1** wherein said whorl means is beneath the lower portion of the bobbin in spaced relation thereto and has an extension extending into telescopic relation with the lower portion of said bobbin, said clutch means being carried by said extension and comprising elements moveable on said extension into and out of engagement with the lower portion of the bobbin, and said member being moveable axially relative to the extension into and out of engagement with said elements to control the movement of said elements on said extension.

3. The combinatoin according to claim **1** in which said extension surrounds the lower portion of the bobbin, said elements extending radially through said extension and being engageable with the outer surface of the lower portion of the bobbin, said member comprising a sleeve rotatable on said extension and having a conical upper portion in the range of the outer ends of said elements cooperating with said elements to control the movement thereof.

4. The combination according to claim **3** in which the conical upper part of said sleeve tapers inwardly toward the top of the sleeve, and a spring is provided between said extension and the bottom of the sleeve urging the sleeve downwardly on the extension.

5. The combination according to claim **1** in which said clutch elements comprise a plurality of two-arm levers tiltably supported by said extension means and each having a portion of one arm thereof located adjacent said bobbin, spring means acting on the other arm of each lever operable to actuate the pertaining two-arm lever for selectively causing said portion of one arm thereof frictionally to engage a bobbin supported by said bobbin supporting body thereby drivingly to interconnect said whorl means and bobbin, said member associated with said clutch means comprising a mechanical actuator selectively moveable into engagement with said other arms of said levers to tilt the levers against the bias of said springs and disengage said portions of the said one arms thereof from said bobbin.

6. The combination according to claim **5** in which said levers are inside said extension and said portions of said one arms thereof are inside said lower portion of the bobbin, said member extending axially into said spindle shank from the lower end thereof, a conical ring on the upper end of said member for engagement with said other

arms of said levers upon axial movement of said member thereby to tilt the levers to disengage the said portions of the said one arms thereof from said bobbin, said member having a threaded connection with said spindle shank, and said means connected to said member comprising a lever attached to the member for rotating it relative to said spindle shank.

7. The combination according to claim 5 in which the center of gravity of each of said two-arm levers is located above the point of pivotal connection thereof with said extension means whereby the said one arm of each lever is urged outwardly toward bobbin engaging position by centrifugal force as said whorl means rotates.

8. The combination according to claim 1 in which said bobbin supporting body means comprises a lower part at the lower portion of the bobbin having a dependent cup shaped portion, said clutch means comprising a first multipole magnet carried by said spindle shank to rotate therewith and located in said cup shaped portion near the top thereof and a second multipole magnet in the cup shaped portion beneath said first multipole magnet,

said member comprising a sleeve nonrotatable but axially moveable in said cup portion and supporting said second multipole magnet, said sleeve in one extreme axial position in said cup shaped portion positioning said magnets relatively in coupling relation to establish said drive connecton of said whorl means with said bobbin and in its other extreme axial position in said cup shaped portion positioning said magnets relatively in uncoupling position to interrupt said drive connection of the whorl means with said bobbin, said means connected to said member comprising a ring surrounding said cup shaped portion and connected through the wall thereof with said sleeve.

References Cited by the Examiner

UNITED STATES PATENTS

3,120,094	2/1964	Keyser	57—130

FOREIGN PATENTS

350,633	6/1931	Great Britain.

STANLEY N. GILREATH, *Primary Examiner.*