Jan. 10, 1961 E. D. PHILLIPS 2,967,433

APPARATUS FOR SUPPORTING AND FACILITATING THE HANDLING OF WORK TOOLS

Filed Feb. 15, 1957 2 Sheets-Sheet 1

FIG. 1

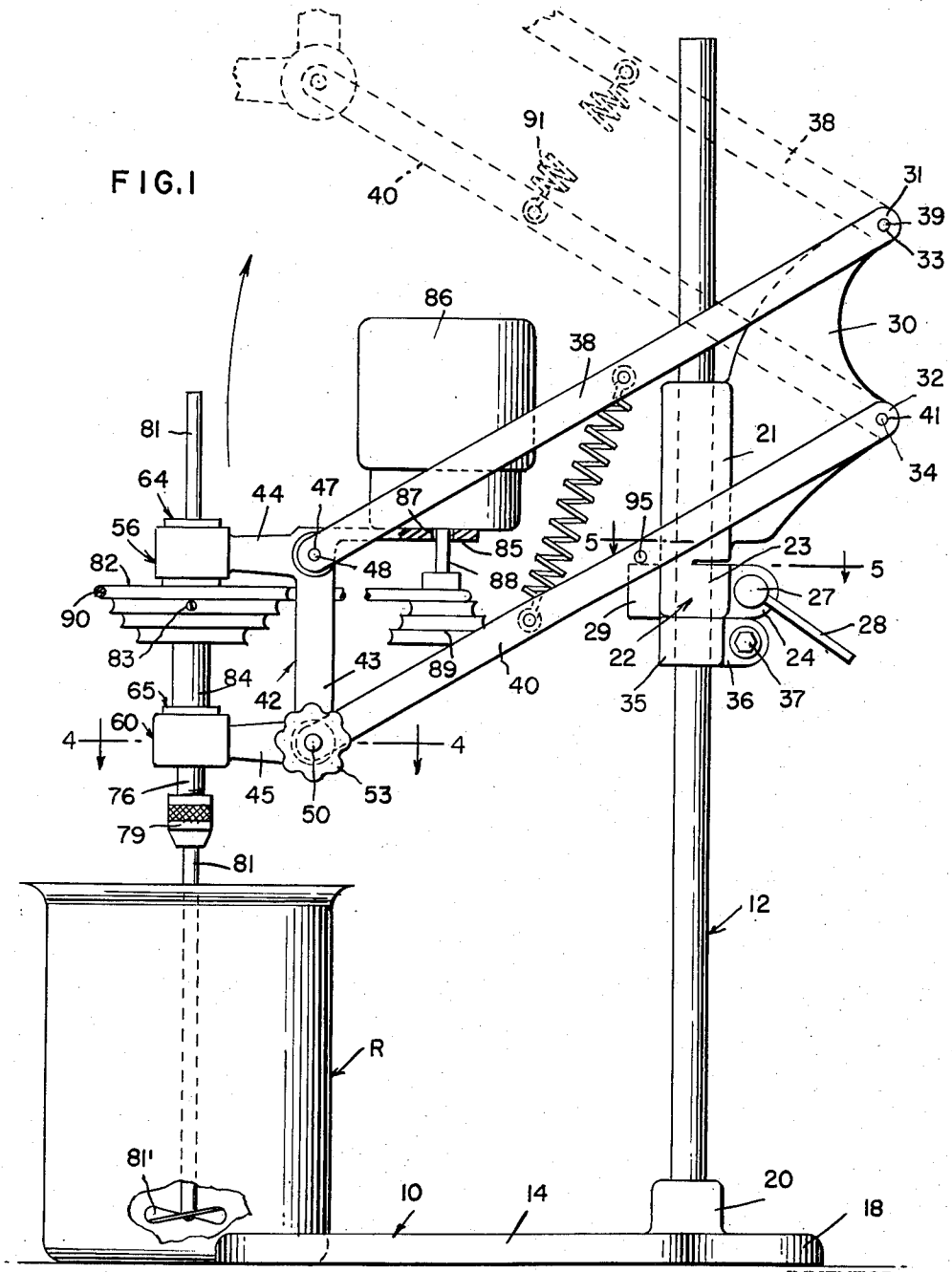

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FIG.2

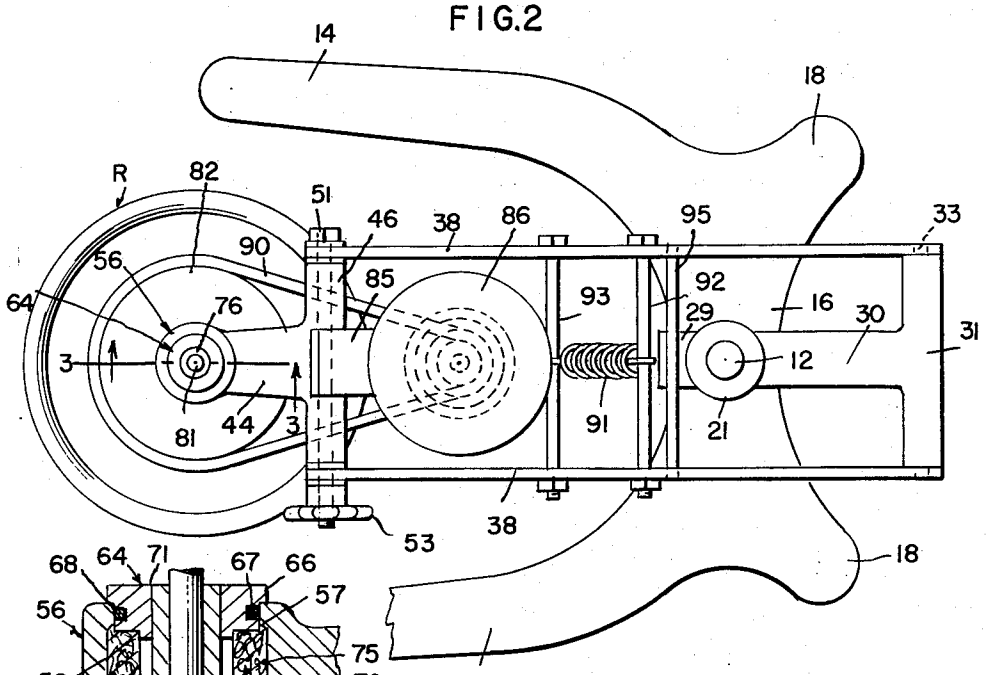


FIG.3

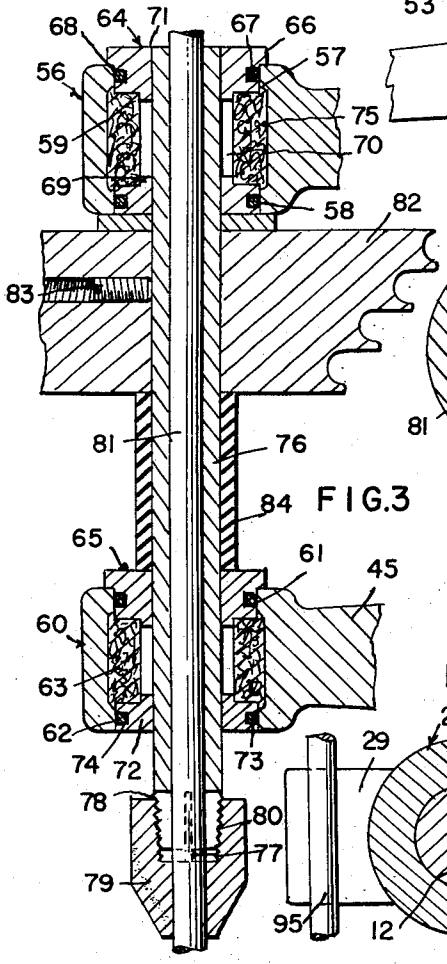


FIG.4

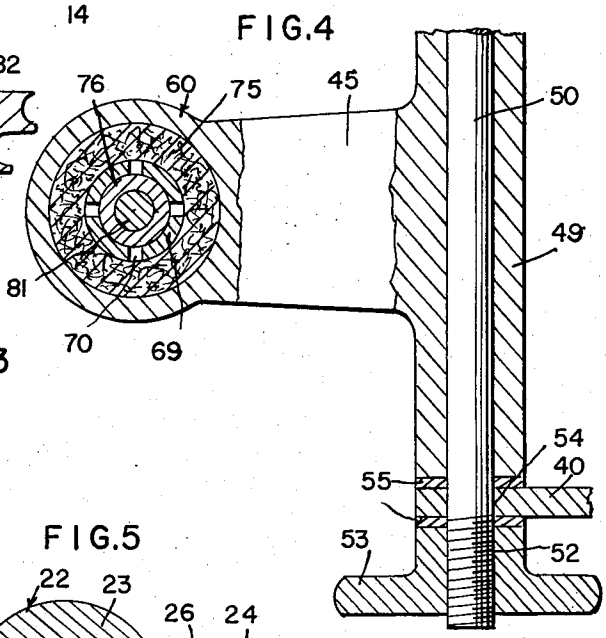
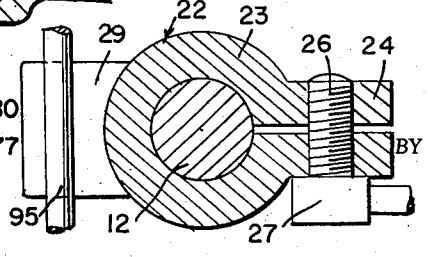


FIG.5



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APPARATUS FOR SUPPORTING AND FACILITATING THE HANDLING OF WORK TOOLS

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15 Claims. (Cl. 74—16)

This invention relates generally to improvements in apparatus for supporting and facilitating the handling of certain types of work tools and is designed particularly for supporting a rotary mixer.

In certain types of laboratory work and in other lines of industry it is required that mixing operations be performed and for such operations, where they have to be continued over a considerable length of time, mechanically driven mixers are essential. In this connection such mixers must be supported in such a way that they can be readily shifted vertically or horizontally to facilitate the proper placement of a mixing or stirring element in a receptacle and it is, therefore, a particular object of the present invention to provide a new and novel apparatus for supporting a power driven tool such as a rotary stirrer or mixer in such a manner that it may be readily shifted vertically and/or horizontally as may be required in connection with the use thereof.

Another object of the present invention is to provide a new and improved apparatus of the character stated which is so designed that a vertically disposed rotatable shaft forming a part of a mixer or other operating implement may be given both vertical rectilinear movement and lateral translation movement and may be easily and quickly fixed in any position to which it is moved either in a vertical direction or in a horizontal direction so as to maintain such position while the tool is being operated.

Another object of the invention is to provide an apparatus of the character stated wherein a novel rotary shaft supporting yoke is provided and supported by parallel moving arms for vertical movement in such a way that the shaft will be maintained at all times in a vertical position so that it can be readily raised and lowered with respect to an underlying body as, for example, a receptacle containing a material to be mixed, when the shaft is employed for rotating mixing blades, and wherein a means is provided for insuring the limitation of the downward movement of the shaft supporting structure to thereby prevent the mixer from being lowered to an undesirable extent in a receptacle in which it is operating.

A still further object of the invention is to provide a device of the character stated having a vertically disposed rotary shaft for supporting mixing blades or the like wherein means is provided for easily and quickly axially adjusting the shaft with respect to a supporting yoke.

Still another object of the invention is to provide an apparatus of the character stated wherein pivoted supporting arms carry a rotary shaft supporting yoke and an operating motor for turning the shaft and wherein the operating motor is mounted upon the arms in such a manner as to have a counterbalancing effect in cooperation with a control spring so as to enable an operator to raise or lower the shaft or mixing head with a minimum of effort.

The invention will be best understood from a consideration of the following detail description taken in connection with the accompanying drawings forming part of the specification, with the understanding, however, that the invention is not confined to a strict conformity with the

showing of the drawing but may be changed or modified so long as such changes or modifications mark no material departure from the salient features of the invention as expressed in the appended claims.

In the drawings:

Fig. 1 is a view in side elevation, with certain parts broken away, of an apparatus constructed in accordance with the present invention, the same being shown with the shaft supporting head or yoke in lowered position with respect to a receptacle and the head supporting arms being shown in broken lines in elevated position;

Fig. 2 is a top plan view of the apparatus, with portions broken away;

Fig. 3 is a vertical section taken substantially on the line 3—3 of Fig. 2, the section being on an enlarged scale;

Fig. 4 is a horizontal section on an enlarged scale taken substantially on the line 4—4 of Fig. 1;

Fig. 5 is a detail section on an enlarged scale taken substantially on the line 5—5 of Fig. 1.

Referring now more particularly to the drawings, the numeral **10** generally designates a base for the present apparatus and upon which is mounted in vertical position the standard **12**.

The base **10** may be of any suitable design but is here shown as comprising a substantially U-shaped structure having the spaced divergent arms **14** connected by the substantially semi-circular yoke portion **16** and the yoke portion on the convex side or the side away from the arms has extending in outwardly divergent relation therefrom the short bracing ears **18**.

The arms **14** of the base are set apart a substantial distance so that a receptacle or piece of work may be placed between the arms on a supporting surface such as a table, bench or the like upon which the apparatus is set up. While a particular form of base has been shown and described it is, of course, understood that the invention is not limited to a base of this specific character since the ears **18** may be extended to a greater length, if desired, to give greater stability to the structure or other alterations may be made in the base so long as it is of sufficient size or covers a sufficiently large surface to support the overlying structure firmly.

The standard **12** comprises a rod of substantial length and externally circular cross section and the lower end of the standard may be secured in an upstanding socket **20** forming a part of the base, or it may be secured to the base in any other suitable manner.

The standard **12** has thereon and extends through a relatively long sleeve **21** which is formed at its lower end to provide a securing clamp **22**. This clamp is here illustrated as comprising a section of the lower end of the sleeve which is partially severed transversely therefrom to form two semi-circular parts **23** each of which is integral with a radially outwardly extending ear **24**, as shown in Fig. 5. These ears **24** are in spaced parallel relation and are connected together by a locking screw **26**, the head **27** of which carries a lever **28** which facilitates the turning of the screw so as to draw the ears together and contract the semi-circular portions **23** into tight grippng engagement with the standard **12**. In this manner the sleeve **21** may be secured to the standard against rotation thereon.

The lower end of the sleeve **21** has formed integral therewith upon the portion forming the clamp **22** and upon the side of the clamp opposite from the ears **24**, the outwardly extending stop lug **29** for the purpose hereinafter set forth.

Upon the side of the sleeve **21** opposite from the lug **29** the sleeve carries above the clamping portion **22** an upwardly extending and radially projecting plate **30** which supports in vertically spaced relation the transversely

disposed upper and lower elongate heads 31 and 32, respectively, the upper one of which is shown in top plan in Fig. 2. These heads 31 and 32 may be in the form of bars, either joined to or cast integrally with the plate 30 across which they extend.

The two opposite ends of the upper head 31 carry the axially extending pins or trunnions 33 and the lower head 32 carries similar pins 34.

For supporting the sleeve and the hereinafter described other parts connected with the sleeve, on the standard so as to permit the sleeve to be rotated therearound when the clamping screw 26 is loosened, there is provided a split collar 35 which encircles the standard 12 below the sleeve clamp 22 and which split collar carries spaced ears 36 corresponding to the ears 24 and these ears are connected together by a lock screw 37 corresponding to the locking or clamping screw 26. It will be readily apparent that by tightening the screw 37 the collar 35 will be constricted around the standard and the sleeve 21 can be supported on the collar and can turn thereon as stated.

The upper part of the plate 30 has connected therewith two long swing arms 38, each of which swing arms having one end provided with an aperture 39 to receive one of the pivot pins 33. Below and in parallel relation with each of these upper swing arms 38 is a lower swing arm 40 and these lower arms likewise have apertured ends 41 to receive the lower pins 34 of the head 32. The upper pair of swing arms 38 and the lower pair of swing arms 40, one only of the latter being illustrated, extend forwardly on opposite sides of the plate 30 and the standard 12, as seen in Fig. 2, and these upper and lower pairs of arms support at their forward ends a head yoke which is generally designated 42 which is moved vertically by the arms in the up and down swinging of the latter in unison, in the manner hereinafter described.

The head yoke 42 comprises a vertical body portion 43 from the upper and lower ends of which extend bearing supporting arms 44 and 45, respectively. Extending across the upper end of the body 43 at right angles to the same and to the forwardly extending upper arm 44 is a cross head 46 which is of the same length as the rear upper head 31 and carries the axially extending pins 47 upon its ends which are rotatably engaged in apertures 48 in the forward ends of the upper arms 38.

Extending across the lower end of the body 43 in parallel relation with the cross head 46 is a sleeve cross head 49 which is likewise of the same length as the lower rear head 32. This sleeve cross head has extended therethrough a pin or bolt 50, one end of which carries the head 51 while the opposite end is screw threaded as indicated at 52 in Fig. 4 and has threaded thereon the hand wheel 53.

The forward ends of the lower arms 40 are apertured to receive the ends of the bolt or pin 50, one of the arms being secured between the bolt head 51 and the adjacent end of the sleeve head 49, while the other arm 40 receives in an aperture 54 the threaded end of the bolt or pin 50 and, as shown in Fig. 4, it is desirable that the pin or bolt 50 have placed thereon upon opposite sides of the arm 40 friction washers 55 which are compressed when the hand wheel 53 is rotated in one direction to clamp the ends of the two arms 40 to the adjacent ends of the sleeve cross head 49.

The swing arms 38 and 40 are all of the same length and as the axes on which the rear ends of the upper and lower arms turn are vertically spaced and parallel and the vertical spacing between the forward ends of the upper and lower arms is the same, it will be seen that when the two pairs of arms are swung up and down, the head yoke will be raised and lowered in constantly vertical position.

The upper arm 41 of the head yoke terminates in a circular bearing cylinder 56 which is open at the top and bottom ends as indicated at 57 and 58, and this cylinder is internally enlarged or chambered as indicated at 59.

The lower arm 45 carries on its outer end the bearing cylinder 60 which has top and bottom openings 61 and 62, as illustrated, and this cylinder is internally enlarged or chambered as indicated at 63. These cylinders 56 and 60 are in vertical axial alignment and they have positioned therein the respective bearing spools 64 and 65. These bearing spools are of the same form or construction and accordingly the same reference characters will be employed for referring to the details thereof. Each spool comprises a flanged head 66 and this head is reduced externally to fit into the opening in the top of the bearing cylinder in which it is positioned and the reduced portion of the head is circumferentially channeled as indicated at 67 to receive a packing ring 68.

Between its ends the bearing spool is of reduced diameter as indicated at 69 and the wall of the spool is slotted as indicated at 70 for the passage of lubricant through to the bore 71 of the spool.

The lower end of each spool is also in the form of a flange 72 which fits in the lower opening of the cylinder in which the spool is located and the periphery of this lower flange is circumferentially channeled as indicated at 73 to receive a packing ring 74.

The circumferential recess of each bearing spool coacts with the chambered portion of the cylinder in which the spool is set to form an annular chamber for the reception of lubricant carrying packing such as tow or the like, indicated by the reference character 75.

It will be seen that when the bearing spools are in position in their respective cylinders, the flanged head 66 will rest upon the top of the supporting cylinder and maintain the spool in position.

Extending through the spools 64 and 65 is a bearing sleeve or shaft sleeve 76 which passes through and rotates in the spools and extends beyond the lower cylinder 60 and the lower end of this bearing sleeve is slotted as indicated at 77 and taper-threaded, as indicated at 78, to form a chuck upon which is threaded the chuck nut 79. This chuck nut, of course, is provided with a tapered threaded socket 80 into which the tapered split end of the sleeve 76 is received.

Extending through the bearing sleeve 76 is a rotary shaft 81, the lower end of which extends through the split lower end of the sleeve and through the nut 79 and it will be readily apparent that when the nut is threaded up on the tapered end of the sleeve the latter will be constricted to clamp the shaft and maintain it in position against axial movement.

The lower end of the shaft is here shown as carrying mixer blades 81'.

The bearing sleeve 76 passes through a step pulley which is generally indicated 82 and which is secured to the sleeve against rotation thereon by the set screw 83 and this pulley has interposed between its under side and the top of the lower bearing spool 65 a spacer sleeve 84 which is preferably formed of a shock absorbing or noise reducing material such as rubber or rubber composition, plastic or the like.

The upper cross head 46 of the head yoke has secured to it a motor bracket or supporting plate 85 which extends rearwardly from the head 46 or toward the standard 12 and which is adapted to mount an electric motor 86. For this purpose the plate is provided with an opening 87 for the extension downwardly of the motor shaft 88. The motor shaft 88 is designed to support a step pulley 89 with the steps thereof in corresponding planes with the steps of the pulley 82 and these step pulleys or cone pulleys are arranged in the conventional manner so that the smallest diameter step of one will be in the plane of the largest diameter step of the other to facilitate changing the speed at which the shaft 81 may be rotated, the rotary power being delivered from the pulley 89 to the pulley 82 by a conventional belt 90.

To facilitate the raising and lowering of the head yoke and parts supported thereby, a spring **91** is connected between the upper pair of arms **38** and the underlying pair of arms **40**. One end of this spring **91** connected to a bolt **92** which extends across between and through the upper arms **38** while the lower end of the spring is attached to a corresponding bolt **93** which extends across between and connects the lower pair of arms **40**. The upper bolt **92** is positioned nearer to the pivoted rear ends of the arms **38** than the lower bolt **93**. In other words, the upper bolt **92** is rearwardly of the lower bolt **93** and the spring is adjusted so that when the arms are swung down to place the head yoke **42** in its lowest position, the spring will be stretched or under tension.

The motor **86** being supported upon the head yoke **42** rearwardly thereof, counterbalances the structure so as to make the downward movement of the arms somewhat easier and facilitate placing the spring under tension and, of course, when an upward push is applied to the head yoke the tensioned spring will assist in the raising or swinging upwardly of the arms and the yoke and motor supported thereby.

The bolts **92** and **93** hold the arms **38** of the upper pair and the arms **40** of the lower pair in the proper relation and maintain the ends of the arms upon the supporting pivots or trunnions **33**, **34** and **47**.

In addition to the bolt **93** connecting the lower arms **40** there is extended between these arms rearwardly of this bolt a cross pin or stop pin **94** which is located so that when the upper and lower pairs of arms are swung down to the lowermost position, it will engage the top of the stop lug **29** which is carried by the lower end of the sleeve **21**. Thus it will be seen that after the sleeve **21** has been raised or lowered to a desired position, and proper longitudinal adjustment has been made of the shaft **81**, the downward movement of the shaft will be controlled so that the danger of the lower end of the shaft or the blades **81'** carried thereon striking the bottom of a receptacle in which the blades may be located will be avoided.

The present apparatus was designed primarily, as hereinbefore stated, as a support for a rotary mixer such as the shaft **81** carrying the blades on the lower end thereof, and in Fig. 1 there is illustrated a receptacle generally designated R, showing the mixer blades on the lower end of the shaft in position therein. It will be seen that by reason of the novel manner in which the shaft is supported within the bearing sleeve **76**, the shaft can be raised or lowered or, in other words, lengthened or shortened, with respect to the receptacle R and when it is desired to move the blades out of the receptacle, this can be accomplished by loosening the hand wheel **53** and swinging the supporting pairs of arms upwardly. Due to the novel manner in which the pairs of arms are mounted, the up and down movement of the shaft will be straight or rectilinear at all times. Obviously, also the arms can be raised and fixed in a raised position so that the mixing blades on the lower end of the shaft can be set at any desired elevation with respect to or in the receptacle R and, as hereinbefore stated, after the vertically movable sleeve body **21** has been properly set and the shaft **81** has been fixed in the desired position, the stop pin **95** will engage the stop lug **29** and prevent the possibility of the blades being swung down to the point where they will strike the bottom of the receptacle.

In addition to the construction being such as to permit the smooth vertical rectilinear movement of the shaft and the securement of the shaft in any desired elevated position, it will be seen that it is also possible with this apparatus to move the shaft in a circular horizontal path, thereby making it possible to operate the mixer with respect to several receptacles by raising the rotating mixer shaft from one receptacle, then swinging the arms around in a horizontal circular path with respect to the standard **12** until the shaft is in proper position for the lowering of the mixer blades into an adjacent receptacle. In this operation the locking screw **26** will, of course, be loosened so that the split collar **35** will provide a supporting bearing upon which the lower end of the sleeve body **21** will rest and may turn. Also it will be apparent that in adjusting the sleeve body **21** on the standard **12** the collar **35** can be likewise adjusted so as to be maintained always in engagement with the lower end of the sleeve body or with the split clamping portion **22** thereof to prevent any accidental downward movement of the body **21** in the event that the locking screw **26** should not be sufficiently tight on the standard.

While the invention has been illustrated and described in connection with mixing blades carried by the shaft **81**, obviously it may be employed in other capacities where the use of a vertically movable and vertically adjustable tool-carrying rotary shaft is desirable.

I claim:

1. As a new combination in an apparatus of the character described an upright support, a member carried by the support for movement thereon, means for securing said member in a position of adjustment on the support, arms pivoted at one end to said member for vertical swinging movement, a head yoke between and pivotally coupled to and carried by the other ends of said arms, a shaft rotatably supported in vertical position by the head yoke, said arms being so constructed and arranged as to impart vertical rectilinear movement to the shaft upon vertical swinging of the arms, and power means supported by the arms between said support and the head yoke to move with the same and having driving connection with the shaft.

2. Apparatus of the character described comprising a base, a standard thereon, a member mounted on the standard for movement therealong, means for securing the member in an adjusted position on the standard, two pairs of parallel arms of equal length disposed one pair above the other, each pair of arms being pivotally coupled at one end to said member for vertical swinging, the pivot axes of the two pairs of arms being parallel, a body disposed between the upper and lower pairs of arms at the other ends thereof, the said other ends of the pairs of arms being pivotally joined to the body to turn on pivot axes paralleling the first axes, a pair of vertically spaced aligned bearings carried by the body, a rotary shaft passing through said bearings, means for retaining the shaft in a position of longitudinal adjustment relative to the bearings, and power means carried by said body between the body and the standard for imparting rotation to the shaft.

3. The invention according to claim 2, wherein the said power means is supported on said body and there is a driving coupling between the motor and the shaft.

4. The invention according to claim 2, wherein the standard is disposed between the arms of each pair with the first said pivot axes disposed across the side of the standard remote from said body.

5. As a new combination in an apparatus of the character described a base, a standard mounted thereon, a sleeve slidably supported on the standard, means for securing the sleeve against movement on the standard, an elongate flat wing plate carried by and disposed in a vertical plane and projecting radially from the sleeve, an upper pair of pivot members carried by and aligned transversely of the plate, a lower pair of pivot members carried by and aligned transversely of the plate, the axes of the upper and lower aligned pivot members being parallel and in the same vertical plane, two pairs of parallel arms of equal length, one pair being disposed above the other and the arms of each pair being horizontally spaced, the arms of the upper pair each being pivotally joined at one end to an upper pivot member and the arms of the lower pair each being pivotally joined at one end to a lower pivot member, the pairs of arms extending across and on opposite sides of the standard,

a head yoke having a vertical body portion pivotally joined to the other ends of the two pairs of arms on said opposite side of the standard to turn relative thereto on axes parallel with the first named axes, a pair of vertically spaced and aligned bearings carried by said head yoke, a shaft, means mounting the shaft in said bearings for rotation, means for imparting rotation to the shaft, said pairs of arms functioning when swung on the first named axes to move the shaft along a rectilinear path, and means for securing the arms against vertical swinging movement.

6. The invention according to claim 5, with a spring means coupling the upper and lower pairs of arms together and urging upward swinging of the arms.

7. The invention according to claim 5, wherein the said securing means is adapted to frictionally clamp the arms of one pair to the said body portion of the head yoke.

8. The invention according to claim 5, with a bracket carried by the head yoke on the side of the body portion thereof remote from the bearings and the rotation imparting means comprising a prime mover mounted on the bracket and a drive coupling between the prime mover and shaft.

9. The invention according to claim 8, with a spring means between the prime mover and the standard and coupling the upper and lower pairs of arms together and urging upward swinging of the arms.

10. As a new combination in an apparatus of the character described a base, a standard mounted thereon, a sleeve slidably supported on the standard, means for securing the sleeve against movement on the standard, a vertical wing plate carried by and projecting radially from the sleeve, an upper pair of pivot members carried by and aligned transversely of the plate, a lower pair of pivot members carried by and aligned transversely of the plate, the axes of the upper and lower aligned pivot members being parallel and in the same vertical plane, two pairs of parallel swing arms of equal length, one pair being disposed above the other and the swing arms of each pair being horizontally spaced, the spring arms of the upper pair each being pivotally joined at one end to an upper pivot member and the arms of the lower pair each being pivotally joined at one end to a lower pivot member, a head yoke embodying an elongate vertical portion carrying spaced right-angularly extending bearing arms, means pivotally coupling the said swing arms of the upper pair having their other ends pivotally coupled to opposite sides of the top end of said vertical portion, means pivotally coupling the other ends of the swing arms of said lower pair to opposite sides of the bottom end of said vertical portion, separate vertically aligned bearings carried by said bearing arms, a shaft rotatably mounted in vertical position in and extending through said bearings, said last means being adapted for clamping the said other ends of the lower pair of swing arms to the yoke head to secure the pairs of swing arms against vertical swinging movement, and means for imparting rotation to the shaft.

11. The invention according to claim 10, wherein the mounting for said shaft comprises a bearing sleeve extending through and connecting said bearings and rotating therein, the shaft extending through the sleeve, and means for securing the shaft to the sleeve, the said means for imparting rotation to the shaft being connected with the sleeve.

12. As a new combination in an apparatus of the character described a head yoke including a body carrying at least two bearing arms, separate, spaced means supporting the head yoke for movement along a vertical rectilinear path, coaxial bearings carried by said arms for axial movement by the head yoke parallel with said path, a bearing sleeve extending through and connecting the bearings for rotation therein, a shaft extending through the sleeve, the shaft being axially adjustable in the sleeve, means for securing the shaft to and in adjusted position in the sleeve, a work performing implement upon the lower end of the shaft, and means for connecting a power source to the sleeve between the bearings for rotating the latter and the shaft.

13. The invention according to claim 12, wherein each of said arms is formed to provide a barrel, said bearings each being secured in a barrel, and coacting means between each barrel and the bearing therein providing a lubricant chamber.

14. The invention according to claim 12, wherein each of said arms is formed to provide a barrel, said bearings each comprising a spool secured in the barrel, a seal between each end of each spool and the encircling portion of the adjacent barrel, each spool between the sealed ends thereof having radial wall openings, and lubricant carrying means within each barrel around the spool therein.

15. The invention according to claim 10, wherein the said means adapted for clamping the said other ends of the lower pair of arms embodies a bolt passing freely through said other ends of the lower arms and through the vertical portion of the head yoke, a head on one end of the bolt engaging the adjacent arm and a hand wheel threaded on the other end of the bolt for drawing the arm ends and head yoke together to secure the arms and head yoke against relative turning.

References Cited in the file of this patent

UNITED STATES PATENTS

1,272,845	Peck et al.	July 16, 1918
1,577,457	Evans	Mar. 23, 1926
1,638,938	Koenigkramer	Aug. 16, 1927
1,671,718	Harrington	May 29, 1928
1,889,947	Carlson	Dec. 6, 1932
2,049,434	Erickson	Aug. 4, 1936
2,157,683	Volrath	May 9, 1939
2,176,572	Hedgpeth	Oct. 17, 1939
2,184,020	Repasy	Dec. 19, 1939
2,368,982	Guze	Feb. 6, 1945
2,855,837	Bakke	Oct. 14, 1958

FOREIGN PATENTS

924,796	Germany	Mar. 7, 1955