

[54] **PORTABLE APPARATUS FOR FORMING BENDS IN CONCRETE REINFORCING RODS**  
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[57] **ABSTRACT**

Lightweight apparatus for forming bends in concrete reinforcing rods at a construction site is described. The inner surface of one of the legs of an elongated angle iron provides a platform for supporting a rod to be bent, and a first stud around which the rod is bent projects over the platform from the other leg adjacent an end of the angle iron. A lever plate is mounted on the exterior side of the second leg for pivotal motion about the axis of the first stud. A second stud projects from a location on the lever plate providing orbiting of the same around the first stud on pivotal motion of the lever plate to bend any rod between such studs around the first stud. The lever plate has an elongated handle attached to it to facilitate pivotal motion thereof by hand.

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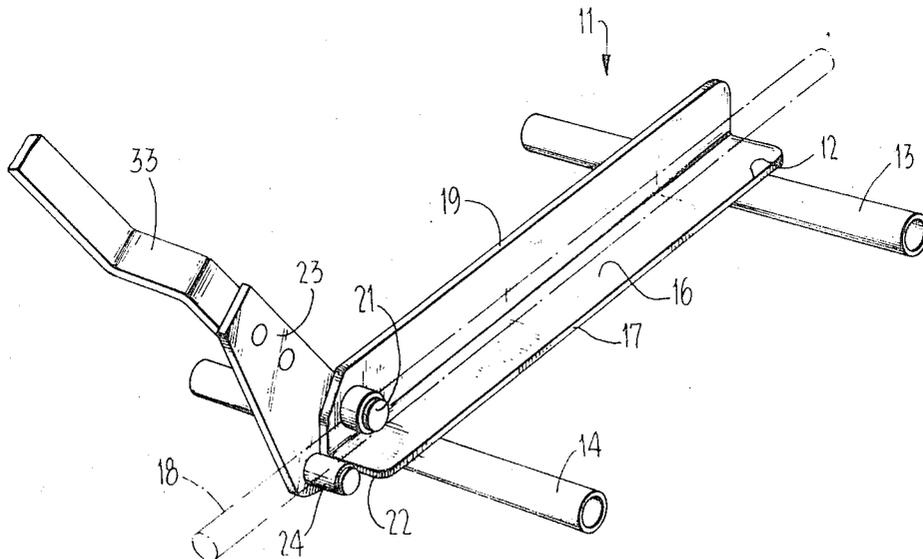
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**9 Claims, 4 Drawing Figures**



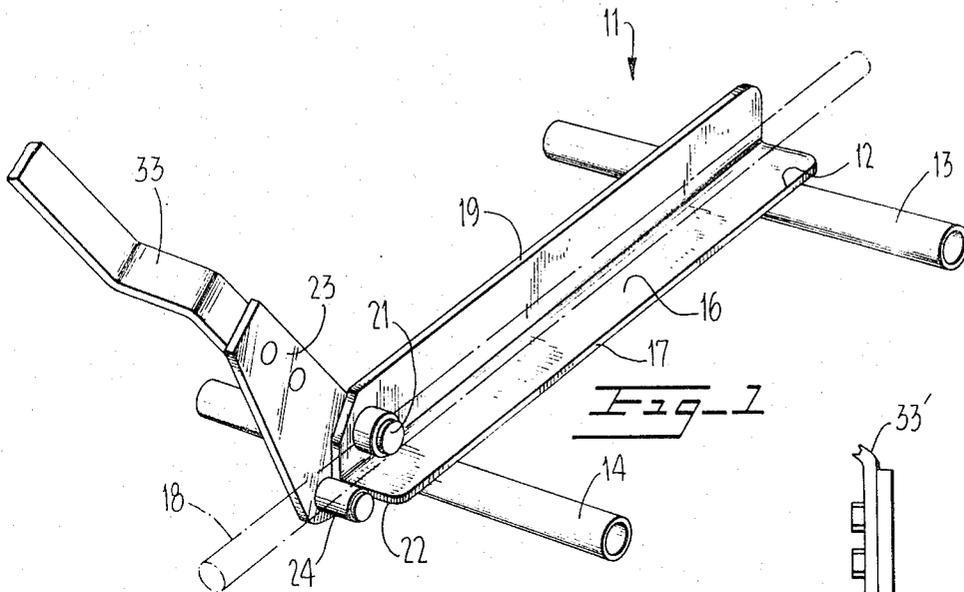


Fig. 1

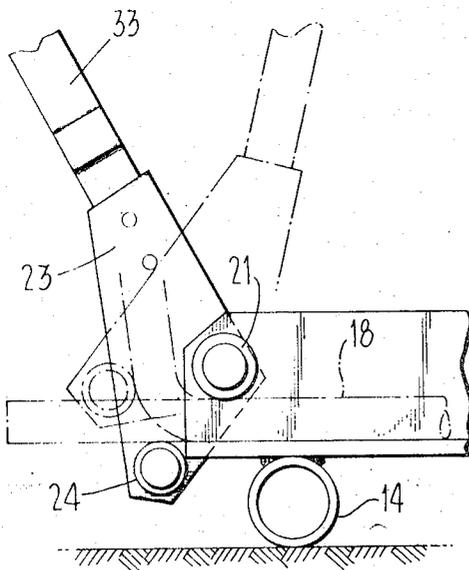


Fig. 2

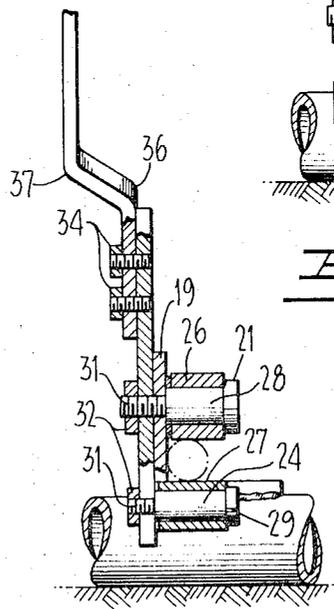


Fig. 3

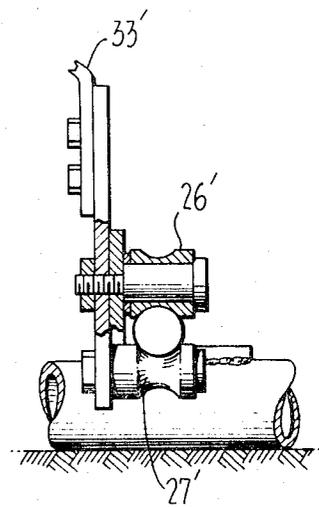


Fig. 4

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## PORTABLE APPARATUS FOR FORMING BENDS IN CONCRETE REINFORCING RODS

### BACKGROUND OF THE INVENTION

This invention relates to the formation of bends in rods, such as in concrete reinforcing rods, and more particularly, to a lightweight, portable apparatus facilitating the formation of such bends at a construction site.

During reinforced concrete construction, such as in the construction of buildings and the like, it is often necessary or desirable to bend the steel rods which make up the lattice work for reinforcing the concrete. For example, the reinforcing steel for a concrete column is most often made up of a plurality of spaced vertical rods which are positioned extending lengthwise of the desired column and arranged to define a peripheral shape similar to that desired for the finished column. The vertical rods or bars are then secured together in the desired spaced relationship by other rods which extend laterally around the periphery of the vertical bars.

The laterally extending peripheral rods must be bent to conform to the peripheral shape defined by the vertical bars. However, by necessity such rods are quite strong and resist bending. It is therefore the common practice to not attempt to bend the rods at the construction site at which the column is being erected, but rather prebend them at another location at which a large and heavy rod bending apparatus is permanently located for this purpose. The prebent reinforcing rods are then delivered to the job site for use in constructing the steel lattice work for the column.

It will be appreciated that the formation of bends in rods away from a job site has certain disadvantages. For example, work will be delayed if through either poor planning or late delivery the bent rods are not available at the time the work crew needs them for the column erection. Moreover, if it is found that the rods are not bent into almost the exact shape required, the work must be delayed while new rods are correctly bent off the site and then delivered.

There has been some concrete reinforcing rod bending apparatuses designed for on-the-job use in attempts to obviate the above disadvantages. Most often, though, such apparatuses have been large and cumbersome due to the structural strength they need in order to form the desired bends. Furthermore, most of such available apparatuses have to be bolted down in order to be used, and many of them are motor operated which adds to their bulkiness and lack of mobility. Such apparatuses are, in effect, the same as the large and cumbersome rod bending apparatuses designed for off-site use and, for this reason, have not been widely accepted.

### SUMMARY OF THE INVENTION

The present invention is a lightweight apparatus for forming bends in elongated rods which is portable and designed for manual operation at a construction site, and yet has the requisite strength necessary to form the bends. In its basic aspects, the apparatus comprises a transportable platform on which a rod to be bent can be supported and a first stud rigidly secured to the platform at a fixed location which is spaced from the rod supporting surface a distance sufficient to enable a rod to be bent to be placed between the stud and the surface. Such stud is provided with an external peripheral

surface around which a rod on the platform can be bent and which is compatible with the desired shape for the bend.

A lever plate is pivotally mounted with respect to the platform for pivotal movement about an axis which is generally parallel to the axis of the peripheral surface of the stud. A second stud projects from the lever plate in a direction which is generally parallel to the pivot of such plate and from a location on the plate which is also spaced from the first mentioned stud a sufficient distance to enable the rod to be bent to be placed between such studs. Moreover, the platform and the stud on the lever plate are so arranged that both the rod supporting surface of the platform and the second stud can be on the same side of the rod to be bent while the first stud is located on the other side. An elongated handle extends from the lever plate for manually pivoting such lever plate to orbit the second stud around the first stud in a direction which will wrap the rod to be bent around the first stud and thereby form the bend in the rod.

The various parts of the above apparatus are either directly or indirectly secured to the platform so that the full apparatus can be transported as a single unit. Most desirably, the platform is provided with an elongated angle iron, the interior surface of one of its legs providing the support surface for a rod to be bent and the first stud mentioned above projecting from the other leg over such support surface. The lever plate is desirably mounted for pivotal movement along the exterior side of the second leg of the angle iron. The resulting structure has the requisite strength necessary to provide and withstand the forces imparted during the bending of a rod. The elongated handle secured to the lever plate is preferably offset outwardly from the angle iron so that manipulation of the same is not hindered by either the angle iron or a rod to be bent which is supported thereon.

Preferably, the stud which projects from the lever plate and actually bends the rod around the first stud is formed by a cylindrical sleeve which is rotatably mounted on a journal pin projecting from the lever plate. This enables the surface of the stud, i.e., the external surface of the sleeve, which engages the rod to roll along the rod as it causes the same to bend. Thus, discontinuities in the surface of the rod which might tend to hinder movement of the stud along the rod are prevented from doing so. This is an especially important feature insofar as the bending of a concrete reinforcing rod is concerned since the exterior surfaces of such a rod normally include projecting ribs to enhance the engagement between the rod and the concrete which it is to reinforce.

The invention includes other features and advantages which will be described or will become apparent from the following more detailed description of a preferred embodiment.

### BRIEF DESCRIPTION OF THE DRAWING

With reference to the accompanying one sheet of drawing;

FIG. 1 is an isometric view of a preferred embodiment of the portable rod bending apparatus of the invention, showing the same with the upper end portion of the handle removed;

FIG. 2 is a partial and enlarged elevation view of the apparatus of FIG. 1, illustrating the rod bending lever plate in full lines prior to it being pivoted to bend a rod

and showing the same in phantom lines during a bending operation.

FIG. 3 is an enlarged end view of the apparatus of FIG. 1 with portions broken away and removed for simplicity and to better illustrate its construction; and

FIG. 4 is an enlarged end view similar to FIG. 3 of an alternate embodiment of the invention.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

With reference to FIG. 1, a preferred embodiment of the portable apparatus for bending rods is generally referred to by the reference numeral 11. As is illustrated, such apparatus is made up of an elongated angle iron 12 which is provided adjacent its respective ends with spaced apart tubular legs 13 and 14. Such legs are secured to the bottom of the angle iron by any suitable means, such as by welding, and extend transversely thereof and outwardly to provide lateral support for the apparatus.

The angle iron 12 is the main structural component of the invention and should be of relatively strong stock, e.g., one quarter inch rolled steel. It provides, among other things, a platform for supporting a rod to be bent. More particularly, the interior surface 16 of the leg 17 thereof is arranged to be horizontal when the apparatus is appropriately positioned on a horizontal surface to thereby also horizontally support a rod to be bent which is shown in phantom at 18.

The other leg of the angle iron, leg 19, extends vertically upward from the platform 16 and acts as a backstop to facilitate proper positioning of a rod to be bent, as well as means to secure the remaining components of the apparatus to the platform. In this connection, a stud 21 around which a rod can be bent projects inwardly from leg 19 over the platform 16 adjacent one end 22 of the angle iron. Such stud is spaced a distance above the platform greater than the transverse dimension or diameter of the rods with which the apparatus is expected to be used so that such rods can be placed between it and the platform. Moreover, it has a cylindrical shaped peripheral surface around which a rod is wrapped to provide the appropriate bend radius and bend configuration.

The stud 21 also acts as means for pivotally securing a lever plate 23 to the angle iron 12. That is, such stud extends through the leg 19 to the exterior side thereof where lever plate 23 is mounted thereon for pivotal movement along such exterior side. A second stud 24 projects outwardly from the lever plate 23 in a direction which is parallel to the axis of the stud 21 and, hence, parallel to the pivot axis of the plate. As can be seen, pivotal motion of the plate 23 about the axis of stud 21 will orbit the stud 24 around the former stud. Moreover, the stud 24 is spaced from the exterior surface of the first stud a distance greater than the diameter or transverse dimension of the rods to be bent so that the rod can also be placed between the bending stud 24 and stud 21, the one around which the rod is bent.

The stud 24 and platform are so arranged relative to one another that both the stud and the platform are positionable on one side of a rod to be bent while the stud 21 is on the opposite side. More particularly, because the stud 21 is adjacent the end 22 of the angle iron, the stud 24 can be orbited around such end of the angle iron to a position adjacent the leg 17 thereof. Most de-

sirably, the stud 24 is so spaced from the stud 21 that when it is in such position the upper exterior surface of the stud lies in the same plane or below the platform surface 16. Such relationship is shown in FIG. 2 and assures that the stud does not hinder the placement of a rod in the proper location on the platform for bending. In this connection, it should be noted that it is because the tubular legs 12 and 14 hold the angle iron, and hence the surface 16, a spaced distance from any surface on which the apparatus is supported that the stud 24 can be located partially below the leg 17 for such relationship.

Most desirably, and as is shown in FIG. 3, both of the studs 21 and 24 are formed by cylindrical sleeves 26 and 27 respectively, rotatably mounted on journal pins 28 and 29. The pins 28 and 29 are, in turn, respectively secured to the angle iron leg 19 and the lever plate 23 via threaded ends 31 and nuts 32. The provision of the studs in this form facilitates movement of a rod between them when it is being bent. That is, the cylindrical sleeves act as rollers which roll along a rod surface as the rod is moved. This feature is especially desirable for apparatus designed to bend concrete reinforcing rods since such rods normally are provided with ribs or bars projecting from their external surfaces to facilitate anchoring of the same within the concrete to be reinforced. Such ribs or bars would tend to obstruct sliding engagement of a rod on the studs during the bending operation, whereas rolling engagement is not materially affected by them. As can be seen from FIG. 2, stud 24 must be moved along the rod surface, in order to effect the desired bend. Thus, it is most desirable that this stud be provided as a roller.

An elongated handle 33 is secured to the lever plate 23 and projects upwardly therefrom to facilitate manual pivoting of the lever plate to form a bend in a rod. The securance of the handle to the lever plate is via a pair of bolts 34 which extend through the handle into the lever plate where they are threadably received.

The handle is so designed that grasping of the same is not hindered by either a rod being bent or the angle iron 12 when it is brought into close proximity thereto. That is, the handle is offset outwardly from the exterior side of the angle iron by being angled outwardly as at 36 and then returned to its original direction by an angle bend at 37. The result is that the portion of the handle which will be grasped, portion 38, is outwardly spaced from the angle iron while extending generally parallel thereto so as to be normal to the direction of pivot of the lever plate. With this construction, a space is provided for the hand of the user between the handle and any rod, such as one which has been bent upwardly, supported by the surface 16, as well as between the handle and the angle iron.

It will be seen from the above that the invention provides a rod bending apparatus which is quite simple and lightweight for portability, while yet being effective for its purpose. To bend a rod, the apparatus can be placed at any suitable location and then the rod to be bent placed along the surface 16 after the lever plate is pivoted to the cocked position shown in FIG. 1. Then in order to form the bend, it is only necessary for a workman to apply pressure to the handle 31 and orbit the stud 24 in an upward direction around the stud 21. The distance through which the stud is orbited will determine the angle of the bend. Because the handle 33 is moved in a vertical plane, the user can obtain substan-

tial leverage so that the bend can be made without the aid of any prime mover such as a motor. In this connection, the handle 33 can be made quite long to provide the necessary leverage.

There may be a tendency with certain rods for the same to slip outwardly of the angle iron from between the studs 21 and 24 during the bending operation. FIG. 4 illustrates an alternate embodiment of the invention which is designed to prevent moving such sideways movement of a rod relative to the rollers during the bending operation. More particularly, as is illustrated, each of the sleeves 26' and 27' of the two studs is relieved to provide an annular concavity around its external periphery which generally conforms with the external surface periphery of the rods to be bent. It can be seen that with this arrangement, the sleeves tend to encompass a portion of the periphery of the rod being bent, and trap it in place during the bending operation. This will prevent the rod from slipping out from between the two studs whenever pressure is on the handle 33' and the rollers 26' and 27' are consequently engaged with the rod. The embodiment of this figure is otherwise the same as the previously described embodiment, and the remainder of it is neither shown nor will it be described in detail.

While the invention has been described in connection with preferred embodiments thereof, it will be appreciated by those skilled in the art that many changes and variations can be made without departing from its scope. It is therefore intended that the coverage afforded applicant be limited only by the claims and their equivalents.

I claim:

1. Portable apparatus for forming bends in elongated rods, such as concrete reinforcing rods, comprising a transportable platform having a support surface for supporting a rod to be bent, a first stud having a cylindrical shaped peripheral surface around which a rod supported by said platform surface can be bent, and secured to said platform at a fixed location spaced from said surface a distance greater than the transverse dimension of said rod to be bent whereby said rod is positionable between said platform and said stud, a lever plate pivotally mounted with respect to said platform for pivotal movement about an axis which is generally parallel to the axis of said cylindrically shaped peripheral surface of said first stud, a second stud projecting from said lever plate in a direction generally parallel to the pivot of said lever plate at a location spaced from said cylindrically shaped surface of said first stud a distance greater than the transverse dimension of said rod to be bent, said second stud and said platform being arranged relative to one another so that said second stud is positionable by said lever plate on generally the same side of said first stud as said platform whereby said rod to be bent is locatable between said first stud and both said platform and said second stud, and an elongated handle extending from said lever plate for manual grasping and pivoting of said lever plate on said axis to orbit said second stud around said first stud in a direction wrapping said rod to be bent around said cylindrical surface to thereby form the desired bend in said rod, said platform being formed of an elongated angle iron with the interior surface of a first leg thereof providing said support surface for a rod to be bent and said first stud projecting over said surface from the second leg of said angle iron, and said lever plate being pivot-

ally mounted for pivotal movement about the axis of said first stud along the exterior side of said second leg.

2. The portable apparatus for forming bends of claim 1 wherein the axis about which said lever plate is pivotal is generally coextensive with the axis of said cylindrical shaped peripheral surface of said first stud whereby said second stud is maintained at substantially the same radial distance from said cylindrical surface while orbited around said first stud.

3. The portable apparatus for forming bends of claim 2 wherein said second stud is formed of a cylindrical sleeve mounted for rotation on a journal pin projecting from said lever plate whereby the surface of said stud engagable with said rod is rollable along said rod upon said pivotal movement of said lever plate in a direction wrapping said rod around said cylindrical surface of said first stud, so that discontinuities in the surface of said rod engaged by said second stud do not hinder said pivotal movement.

4. The portable apparatus for forming bends of claim 3 wherein said first stud is also in the form of a cylindrical sleeve, the exterior surface of which defines said cylindrical peripheral surface, which is mounted for rotation on a journal pin rigidly secured with respect to said platform.

5. The portable apparatus for forming bends of claim 2 wherein the peripheral surface of each of said studs which engage the rod to be bent are generally concave with a radius of curvature generally conforming the same to the exterior surface of said rod whereby said stud surfaces extend around the periphery of said rod and tend to maintain it in place during the bend formation.

6. The portable apparatus for forming bends of claim 1 wherein said elongated handle extending from said lever plate is offset outwardly from said exterior side of said angle iron second leg to extend in a plane spaced therefrom and generally parallel thereto for grasping and manipulation without interference by a rod to be bent supported on said first leg of said angle iron and extending therebeyond.

7. The portable apparatus for forming bends of claim 1 wherein said first stud projects from the second leg of said angle iron at a location adjacent and end thereof, and said axis about which said lever plate is pivotal is coextensive with the axis of said cylindrically shaped peripheral surface of said first stud with said second stud being orbited by pivotal movement of said lever plate on said axis around the end of said angle iron to a location at which the peripheral surface thereof engagable with a rod to be bent is coextensive with or below said support surface of said first leg, and support means are provided for said apparatus and for spacing said angle iron a distance from any support surface therefor sufficient to enable positioning of said second stud with its peripheral surface coextensive with or below said first leg support surface to facilitate placement of a rod to be bent between said first stud and both said leg support surface and said second stud.

8. The portable apparatus for forming bends of claim 7 wherein said support means is in the form of a pair of spaced apart tubular legs secured to the bottom surface of said first leg of said angle iron and extending transversely thereof to provide lateral support for said apparatus.

9. The portable apparatus for forming bends of claim 8 wherein both said first and second studs are individu-

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ally formed by a cylindrical sleeve rotatably mounted on a journal pin respectively projecting from the second leg of said angle iron over said support surface and from said lever plate, and said elongated handle extending from said lever plate is offset outwardly from said exterior side of said angle iron second leg to extend

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in a plane spaced therefrom and generally parallel thereto for grasping and manipulation without interference by a rod to be bent supported on said first leg of said angle iron and extending therebeyond.

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