Dec. 26, 1944. C. F. OSGOOD 2,365,686

DRILL STEEL GUIDE

Filed Feb. 24, 1942 2 Sheets-Sheet 1

Fig. 1.

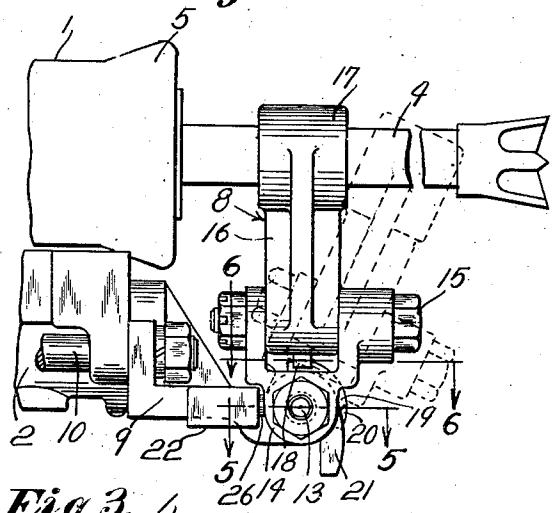


Fig. 2.

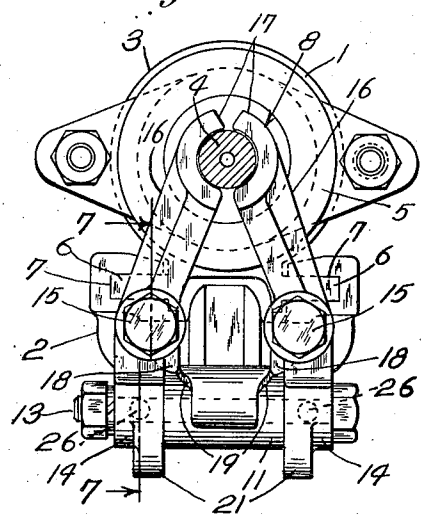


Fig. 3.

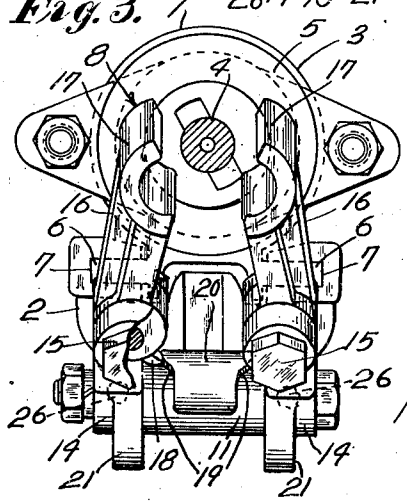


Fig. 4.

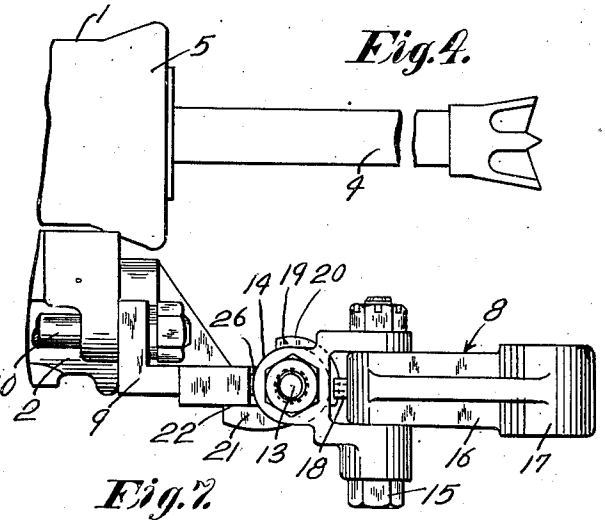


Fig. 5.

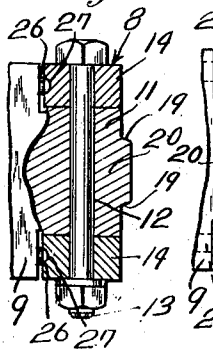


Fig. 6.

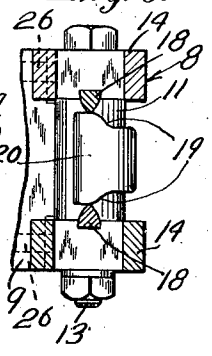
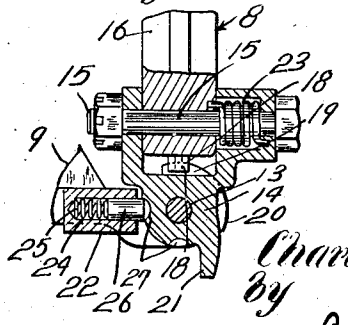


Fig. 7.



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Fig.8.

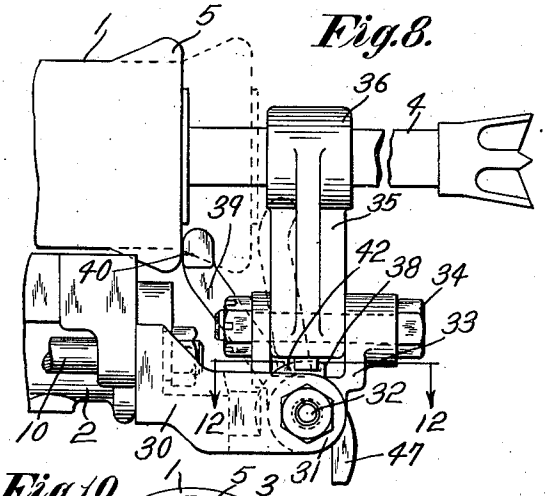


Fig.9.

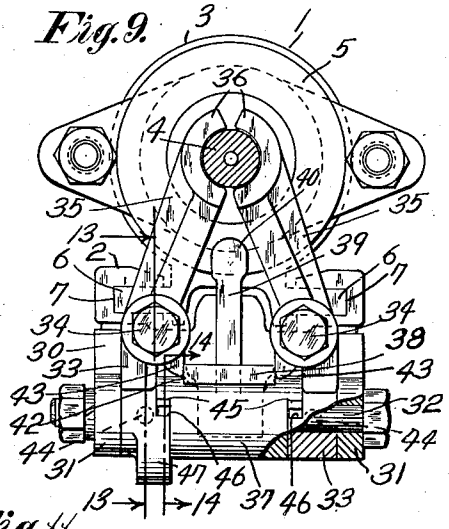


Fig.10.

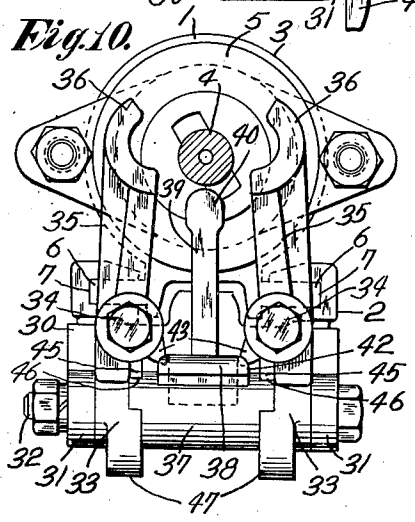


Fig.11.

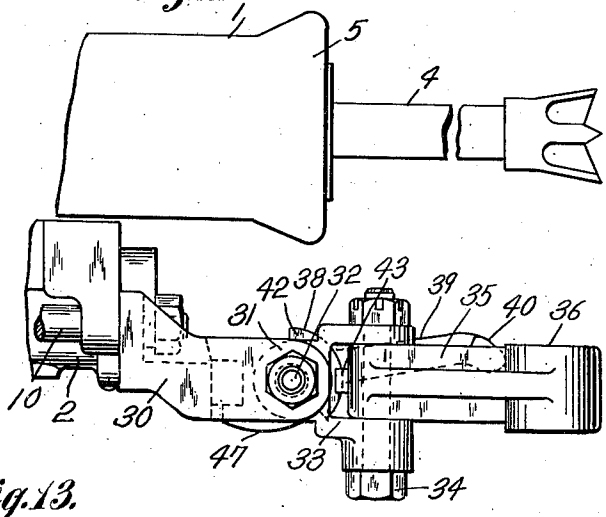


Fig.12.

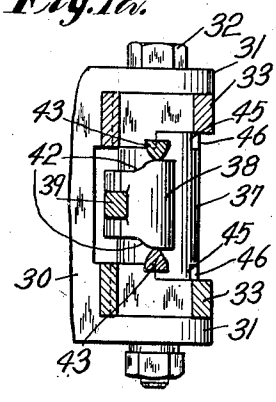


Fig.13.

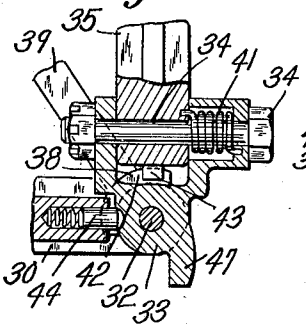


Fig.14.

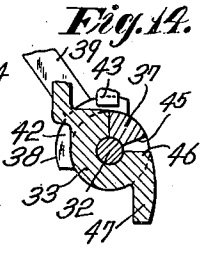
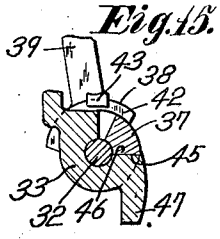


Fig.15.



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UNITED STATES PATENT OFFICE

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DRILL STEEL GUIDE

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Application February 24, 1942, Serial No. 432,151

11 Claims. (Cl. 255—51)

This invention relates to rock drills, and more particularly to improvements in a drill steel guide especially designed for use with a mounted rock drill of the drifter type.

In mounted drifter type rock drills, the drill hammer motor is guided for movement along the guideways of a guide shell, and a guide is usually provided at the forward end of the guide shell for centering the drill steel during "spotting" of a drill hole. Such drill steel guides are usually automatically released from guiding relation with the drill steel as the hammer motor is fed forwardly along the shell guideways, and devices of various kinds have been devised to effect such automatic release. In such guides there are frequently provided a pair of pivoted guide arms which engage the drill steel; and these guide arms, when they are automatically swung apart into non-guiding position as the hammer motor approaches the guide, project laterally a substantial distance beyond the sides of the guide shell to enable the hammer motor to move forwardly between the guide arms. Such lateral projection of the guide arms beyond the sides of the guide shell is found to be undesirable particularly in the restricted spaces of an underground mine. In certain other types of guides, pivoted guide arms are not employed, but while lateral compactness was obtained the desired guiding of the drill steel was lacking.

An object of the present invention is to provide an improved drill steel guide which largely overcomes the disadvantages of certain previous guides. Another object is to provide an improved drill steel guide having novel mounting means for the relatively movable guiding elements thereof whereby the latter, when in their non-guiding position, are maintained within the lateral limits of the guide shell. Still another object is to provide an improved drill steel guide embodying a pair of cooperating guide arms which are pivotally mounted to swing concurrently laterally and longitudinally about rectangularly related axes into and out of guiding relation with a drill steel. A further object is to provide an improved drill steel guide having novel cam means for holding the guide arms in guiding relation with the drill steel and so constructed that there will be movement of the guide arms out of guiding relation with the drill steel upon engagement thereof by the drill hammer motor as the latter is fed forwardly along the shell guideways. Yet another object is to provide a novel drill steel guide having improved means for holding the guide in guiding relation with the drill steel and which is automatically released by the hammer motor as the latter is fed forwardly along the shell guideways. A still further object is to provide an improved drill steel guide having a novel arrangement and combination of parts. How these and other objects are accomplished and the advantageous features of the invention, will be best understood from the following detailed description wherein preferred and modified embodiments are set forth, reference for the purpose being had to the accompanying drawings, in which:

Fig. 1 is a fragmentary side elevational view of a rock drill with which a preferred illustrative embodiment of the improved drill steel guide is associated.

Fig. 2 is a front elevational view of the rock drill and steel guide shown in Fig. 1.

Fig. 3 is an end elevational view similar to Fig. 2, showing the guide arms in their laterally released position.

Fig. 4 is a view similar to Fig. 1, with the guide in its non-guiding position.

Fig. 5 is a horizontal sectional view taken substantially on line 5—5 of Fig. 1.

Fig. 6 is a horizontal sectional view taken substantially on line 6—6 of Fig. 1.

Fig. 7 is a view in longitudinal vertical section taken substantially on line 7—7 of Fig. 2.

Fig. 8 is a fragmentary side eelvational view similar to Fig. 1, illustrating a modified embodiment of the invention.

Fig. 9 is a front end elevational view of the rock drill and steel guide shown in Fig. 8, with parts shown in vertical section.

Fig. 10 is an end elevational view similar to Fig. 9, showing the guide arms in their laterally released position.

Fig. 11 is a view similar to Fig. 8, showing the guide in its non-guiding position.

Fig. 12 is a horizontal sectional view taken substantially on line 12—12 of Fig. 8.

Fig. 13 is a view in longitudinal vertical section taken substantially on line 13—13 of Fig. 9.

Fig. 14 is a detail vertical sectional view taken substantially on line 14—14 of Fig. 9.

Fig. 15 is a view similar to Fig. 14, showing the cam lever in a different position.

In both illustrative embodiments of the invention, the improved drill steel guide is shown associated with a conventional hammer rock drill of the mounted drifter type. It will be evident, however, that if desired the improved drill steel guide may be associated with drills of other types.

The hammer rock drill disclosed herein, in both embodiments of the invention, comprises a conventional drill hammer motor 1 guided for longitudinal movement along a conventional guide shell 2, the latter adapted to be mounted on a conventional drill support. The hammer motor comprises a motor cylinder 3 containing a usual hammer piston (not shown) for percussively actuating a drill steel 4, the latter being supported in a usual chuck within a front chuck housing 5 suitably attached to the front end of the motor cylinder. The motor cylinder has usual lateral guides 6, 6 slidingly received within parallel longitudinal guideways 7, 7 of the guide shell. The hammer motor may be fed along the shell guideways in any conventional manner. Since the rock drill disclosed is of a conventional design and is well known to those skilled in the art, further description and illustration thereof are herein unnecessary.

In the preferred embodiment of the invention shown in Figs. 1 to 7, inclusive, the improved drill steel guide, generally designated 8, comprises a bracket 9 attached by bolts 10, which herein may be the usual shell side bolts, to the front end of the guide shell. This bracket has a forwardly located lug 11 provided with a transverse bore 12 through which a pivot bolt 13 passes. Pivotally mounted on the projecting ends of the pivot bolt are arm supports 14, 14 on which in turn are pivotally mounted on parallel pivot bolts 15 a pair of guide arms 16, 16. The axes of the pivot bolts 15, 15 are arranged at right angles to the pivot bolt 13, so that the guide arms may swing into and out of guiding relation with the drill steel about rectangularly related pivotal axes. These guide arms have guiding portions 17 appropriately shaped to engage the body of the drill steel 4 to hold the latter centered during "spotting" of a hole in the manner well known to those skilled in the art. The guide arms have depending cam engaging projections 18, 18 near their pivots, and the inner adjacent sides of these projections are engageable with outer cam surfaces 19 of a cam 20, the latter herein preferably formed integral with the bracket lug 11. Engagement of the projections 18 with the surfaces of the cam effects holding of the guide arms in their steel guiding position shown in Fig. 2 and limits lateral swinging movement of the guide arms about the pivot bolts 15 as the guide arms are swung apart out of guiding relation with the drill steel. The pivoted arm supports 14 have depending lugs 21 engageable at 22 with the bottom of the bracket 9 for limiting downward swinging of the arm supports and guide arms about the pivot bolt 13. Arranged within suitable recesses in the arm supports and surrounding the pivot bolts 15 are coiled torsion springs 23 which act automatically to swing apart the guide arms about the pivot bolts 15 into their laterally released position. As the guide arms are swung about the pivot bolt 13 in a forward and downward direction, the cam surfaces permit the torsion springs to swing the guide arms a slight distance apart sufficient to clear the sides of the drill steel body, and as the guide arms swing about the pivot bolt 13 they concurrently swing about the pivot bolts 15. Arranged in longitudinal bores 24 formed in lateral lugs 25 integral with the bracket 9 are spring-pressed plungers 26, and these plungers are engageable with spaced detents 27 on the arm supports 14 for holding the guide in both its guiding and non-guiding positions. If desired, coiled torsion springs may be arranged coaxial with the pivot bolt 13 for swinging the arm supports about the pivot bolt to move the guide arms forwardly and downwardly. As the drill hammer motor is fed forwardly along the shell guideways, the forward end of the chuck housing 5 is engageable with the rear surfaces of the guide arms, and as the guide arms are shoved forwardly and downwardly a slight distance they are concurrently swung apart, so that they clear the sides of the body of the drill steel; and as the hammer motor continues to move forwardly along the shell guideways the guide arms are further moved forwardly and downwardly into their non-guiding position shown in Fig. 4, out of the path of movement of the hammer motor, so that the latter may be fed forwardly past the guide. It is accordingly evident that the cam surfaces of the cam 20 are so formed as to result in relative swinging movement of the guide arms about the pivot bolts 15 into and out of guiding relation with the drill steel as the guide arms are concurrently swung about the axis of the pivot bolt 13.

In the operation of this embodiment of the improved drill steel guide, when it is desired to "spot" a drill hole, the guide arms 16, 16 may be swung upwardly and rearwardly about the transverse pivot bolt 13 into the position indicated in dotted lines in Fig. 1, and upon continued upward and rearward swinging movement of the guide arms toward the full line position shown in Fig. 1, the cam surfaces 19 of the cam 20 engaging the arm projections 18 effect concurrent swinging movement of the arms about the axes of the pivot bolts 15 inwardly into guiding relation with the drill steel, as shown in Fig. 2. As the guide arms are swung into guiding relation with the drill steel, the arm projections 18 engage parallel surfaces on the cam, so that the guide arms are locked by the cam against lateral release. As the hammer motor is fed forwardly along the shell guideways, the guide arms serve to center the drill steel, and when the front chuck housing 5 engages the rearward surfaces of the guide arms, the latter are shoved forwardly and downwardly and concurrently moved apart into their laterally released position as shown in Fig. 1. As the guide arms swing forwardly and downwardly from the dotted line position shown in Fig. 1 to the non-guiding position shown in Fig. 4, the arm projections 18 engage parallel surfaces on the cam, so that further outward swinging of the arms about their pivots is prevented by the cam, and when the guide assumes the position shown in Fig. 4, downward movement of the guide arms is limited by engagement of the support lugs 21 with the bottom of the bracket 9. As the guide arms swing forwardly and downwardly from the full line position shown in Fig. 1 to the dotted line position shown in that figure, the coiled torsion springs 23 act automatically to swing the guide arms apart into their laterally released position shown in Fig. 3 sufficiently to clear the sides of the steel body. By the provision of the separate and distinct pivotal mountings for the guide arms, the latter may be individually placed in guiding relation with the drill steel as, for instance, during spotting of a drill hole on an inclined working face when but a single arm will suffice to prevent lateral deflection of the drill steel.

In the modified embodiment of the invention shown in Figs. 8 to 15, inclusive, a bracket 30, attached to the front end of the guide shell 2, has forwardly projecting, laterally spaced lugs 31, 31

provided with alined openings through which a transverse pivot bolt **32** passes. Pivotally mounted on this pivot bolt at the inner sides of the lugs are arm supports **33**, **33** on which in turn are pivotally mounted on parallel pivot bolts **34**, **34** a pair of guide arms **35**, **35**. The axes of the pivot bolts **34**, **34** are arranged at right angles to the pivot bolts **32**, so that the guide arms may swing into and out of guiding relation with the drill steel about rectangularly related pivotal axes. As in the preferred embodiment of the invention above described, these guide arms have guiding portions **36** appropriately shaped to engage the body of the drill steel to hold the latter centered during "spotting" of a hole. Also pivotally mounted on the transverse bolt **32** and arranged between the arm support **33** is a hub **37** having formed thereon a cam **38**. Projecting upwardly from the cam hub is a lever **39** having a portion **40** adapted to be engaged by the front end of the chuck housing **5** of the drill hammer motor, in a manner to be later explained. Arranged within recesses in the arm supports **33** are coiled torsion springs **41**, similar to the torsion springs **23** above described in the preferred embodiment of the invention, and these torsion springs likewise act automatically to swing apart the guide arms about the axes of the pivot bolts **34** into their laterally released position. The cams **38** has cam surfaces **42** which are engaged by cam projections **43** formed on the guide arms **35** near their pivots, and engagement of these cam projections with the cam surfaces effects holding of the guide arms in guiding position and limits outward lateral swinging movement of the guide arms. Spring-pressed plungers **44**, similar to the plungers **26** of the preferred embodiment of the invention, serve to hold the guide in both its guiding and non-guiding positions. As the cam lever **39** is swung forwardly, the cam hub **37** is rotated, causing the cam surfaces **42**, which engage the arm projections **43**, to permit swinging of the guide arms apart a slight distance sufficient to clear the sides of the drill steel body, and upon continued forward swinging movement of the cam lever, surfaces **45** on the cam hub **37** abut surfaces **46** on the arm supports **33**, and when the surfaces **45** and **46** are in abutting engagement, the cam lever, the cam and the arm supports swing in unison forwardly and downwardly about the axis of the pivot bolt **32**. As the cam is rotated in a forward direction, the coiled torsion springs **41** automatically swing apart the guide arms about their parallel pivots into their laterally released position shown in Fig. 10. When the guide arms are in their non-guiding position shown in Fig. 11, they are disposed out of the path of movement of the hammer motor, so that the latter may be fed forwardly along the shell guideways past the guide. The pivoted arm supports **33** have depending lugs **47** engageable with the bottom of the bracket **30** for limiting downward swinging movement of the guide about the pivot bolt **32**.

In the operation of this embodiment of the invention, when the hammer motor is fed forwardly along the shell guideways, the front chuck housing **5** engages the portion **40** of the cam lever, and upon continued forward movement of the hammer motor the cam lever is swung forwardly about the axis of the pivot bolt **32**, resulting in the swinging of the guide arms apart into their laterally released position shown in Fig. 10, so that the guiding portions thereof just clear the sides of the drill steel body. As the cam is rotated, the torsion springs **41** act automatically to swing the guide arms apart into their laterally released position. Upon continued forward and downward swinging movement of the cam lever, as the hammer motor continues to move forwardly along the shell guideways, the surfaces **45** on the cam hub engage the arm support surfaces **46**, and thereafter the cam, arm supports and guide arms swing forwardly and downwardly about the pivot bolt **32** into their non-guiding position shown in Fig. 11 out of the path of movement of the hammer motor. Likewise, as in the preferred form of the invention above described, by the provision of the separate arm mountings, the guide arms may be placed either separately or simultaneously in guiding relation with the drill steel.

It will be evident that in both embodiments of the invention the cam surfaces of the cam may be shaped to obtain any desired movement of the guide arms, and in the modified embodiment the cam may be so arranged and constructed as to bring about concurrent swinging of the guide arms laterally and longitudinally. Also, as in the preferred embodiment, the modified embodiment may have torsion springs encircling the pivot bolt **32** to effect automatic forward and downward swinging movement of the arms upon release of the latter from the drill steel.

As a result of this invention it will be noted that an improved drill steel guide is provided which is extremely rugged and compact in construction and simple in design. It will further be evident that by the provision of the improved pivotal mounting structure for the guide arms, enabling the latter to swing about rectangularly related pivotal axes in the manner disclosed, excessive lateral projection of the guide arms beyond the sides of the guide shell is eliminated. Furthermore, by the provision of the novel cam arrangement, the guide may be quickly thrown into non-guiding position when the hammer motor engages the guide. Also in the modification as the forward end of the drill hammer motor approaches the guide, the cam lever effects automatic release of the guide, thereby eliminating the possibility of jamming of the parts by inadvertent engagement of the hammer motor with the guide. Other uses and advantages of the invention will be clearly apparent to those skilled in the art.

While there are in this application specifically described two embodiments which the invention may assume in practice, it will be understood that these embodiments of the same are shown for purposes of illustration and that the invention may be further modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a drill steel guide, a pair of cooperating, relatively movable guide elements adapted to engage a drill steel, and means for pivotally mounting said guide elements to swing concurrently about parallel axes and an axis at right angles to said parallel axes, and means including cam means for effecting controlled swinging movement of said guide elements laterally about said parallel axes away from the drill steel as said guide elements are concurrently swung forwardly about said right angle axis.

2. In a drill steel guide, cooperating, relatively movable guide elements adapted to engage a drill steel, means including cam means associated

with said guide elements for effecting controlled movement of said guide elements out of guiding relation with the drill steel, said guide elements and said cam means being relatively movable, and means for effecting movement of said guide elements forwardly and downwardly when said guide elements have moved relative to the drill steel sufficiently to clear the sides of the drill steel.

3. In a drill steel guide, cooperating, relatively movable guide elements adapted to engage a drill steel, and means including cam means associated with said guide elements for effecting controlled movement of said guide elements out of guiding relation with the drill steel, said guide elements and said cam means being relatively movable, and means for effecting movement of said guide elements forwardly and downwardly when said guide elements have moved relative to the drill steel sufficiently to clear the sides of the drill steel, said guide elements being movable away from the drill steel out of guiding relation with the latter and forwardly and downwardly into the non-guiding position of the guide.

4. In a drill steel guide, a pair of cooperating, relatively movable guide elements adapted to engage a drill steel, and means including cam means movable relative to said guide elements for effecting controlled movement of the latter out of guiding relation with the drill steel, and means for mounting said guide elements and said cam means to move forwardly and downwardly when said guide elements are out of steel guiding relation.

5. In a drill steel guide, a pair of cooperating, relatively movable guide arms adapted to engage a drill steel, pivotal mounting means for said arms providing parallel pivots for the latter, said mounting means including a pivot for said arms disposed at right angles to said arm pivot axes, and means for effecting swinging movement of said arms about said parallel pivots and said right angle pivot into and out of steel guiding position, said latter means embodying cam means controlling swinging movement of said arms about said pivots.

6. In a drill steel guide, a pair of cooperating, relatively movable guide arms adapted to engage a drill steel, pivotal mounting means for said arms providing parallel pivots for the latter, said mounting means including a pivot for said arms disposed at right angles to said arm pivot axes, means for effecting swinging movement of said arms about said parallel pivots and said right angle pivot into and out of steel guiding position, said latter means embodying cam means controlling swinging movement of said arms about said pivots, and means for constantly urging said arms to swing apart about said parallel axes, said cam means preventing the arms from swinging apart when said arms are in steel guiding position.

7. In a drill steel guide, a pair of cooperating relatively movable guide elements adapted to engage a drill steel, and means for pivotally mounting said guide elements to swing about rectangularly related axes, certain of said axes being disposed parallel to the longitudinal axis of the drill steel when said guide elements are in steel guiding position and another axis being disposed at right angles to said parallel axes, said mounting means embodying means for necessitating initiation of swing of said guide elements about said right angle axis prior to completion of swing of said guide elements about said parallel axes.

8. In a drill steel guide, a pair of cooperating relatively movable guide elements adapted to engage a drill steel, means for pivotally mounting said guide elements to swing each about rectangularly related axes, said guide elements being swingable about certain of said axes laterally away from the drill steel and forwardly about the others of said axes out of guiding relation with the drill steel, means engaging said guide elements for necessitating lateral swing of said guide elements to be accompanied by forward swing thereof, means for holding said guide elements in their steel guiding position, and means engaging said guide elements for automatically swinging said guide elements laterally about said certain pivotal axes when said holding means is released.

9. In a drill steel guide, a pair of cooperating relatively movable guide arms adapted to engage a drill steel, said arms being swingable about pivots arranged with their axes parallel, a support swingable about a transverse axis at right angles to said arm pivot axes, said arm pivots being mounted on said swingable support, means associated with said guide arms for causing said arms to swing laterally about said parallel pivotal axes only when said support swings about said transverse axis to effect release of said guide arms from the drill steel, and means coaxial with said parallel pivotal axes and engaging said guide arms for automatically effecting swinging of said arms about said parallel pivotal axes as said support swings about said transverse axis.

10. In a drill steel guide, a pair of cooperating relatively movable guide elements adapted to engage a drill steel, means for pivotally mounting said guide elements each to swing about rectangularly related axes, said guide elements being swingable about certain of said axes laterally away from the drill steel and forwardly about the others of said axes out of guiding relation with the steel, and embodying means engaging said guide elements for necessitating lateral swing of said guide elements to be accompanied by forward swing thereof, and means for locking said guide elements in their steel guiding position.

11. In a drill steel guide, cooperating relatively movable guide elements adapted to engage a drill steel, means for mounting said guide elements each to swing about rectangularly related axes, said guide elements being swingable about said axes into and out of guiding relation with the drill steel, and means associated with said guide elements for necessitating swinging of said guide elements about certain of said axes to be accompanied by swinging of said guide elements about said other axes.

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