May 19, 1942. G. J. C. FAILING 2,283,866

DRILLING RIG

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Fig. 1.

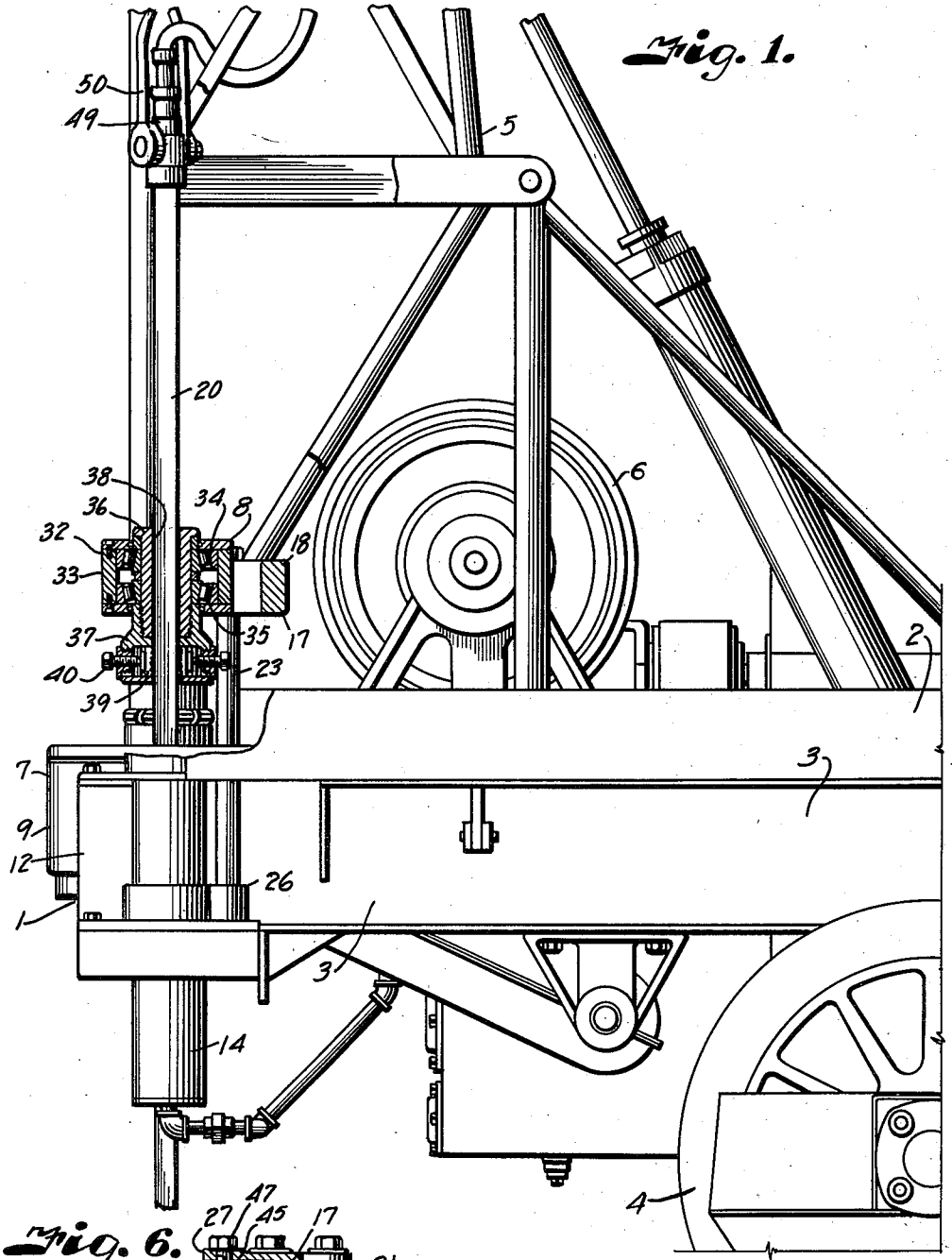
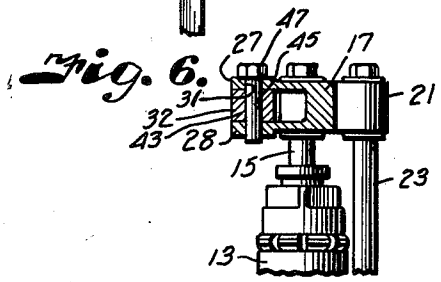


Fig. 6.



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Fig. 2.

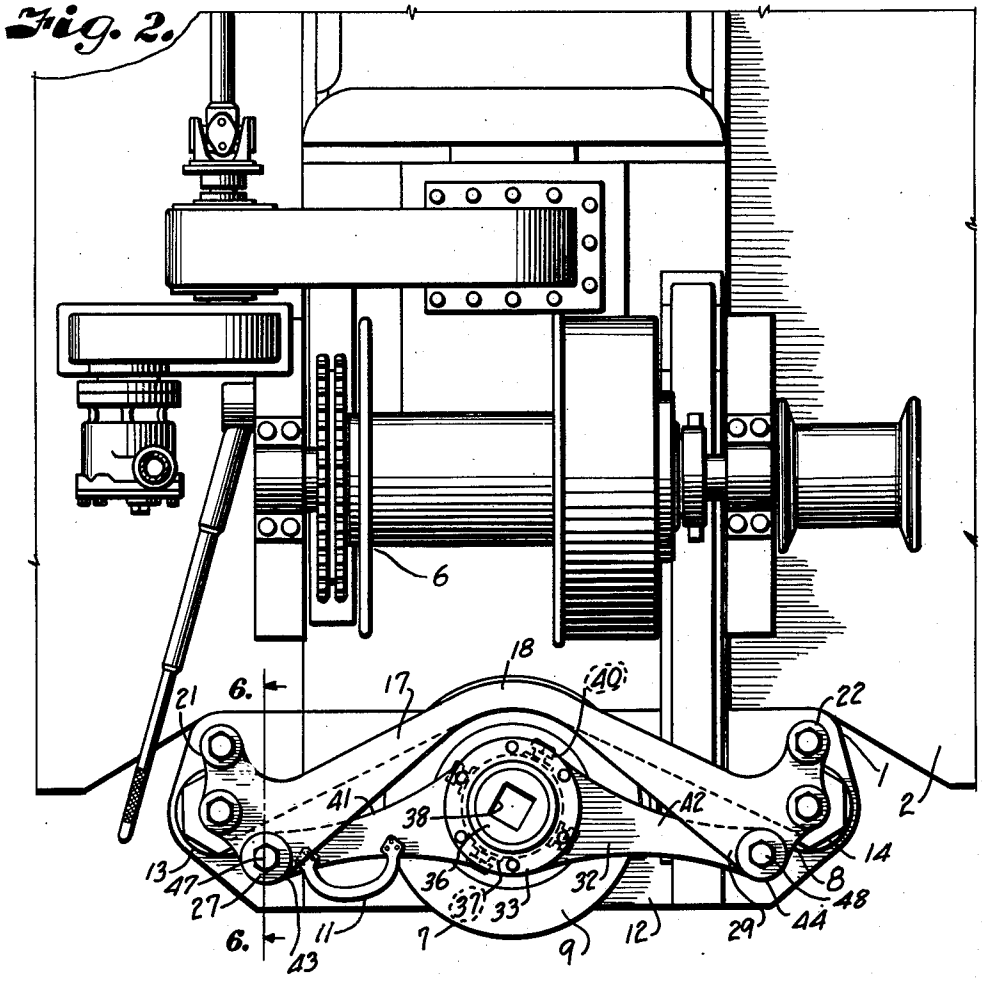
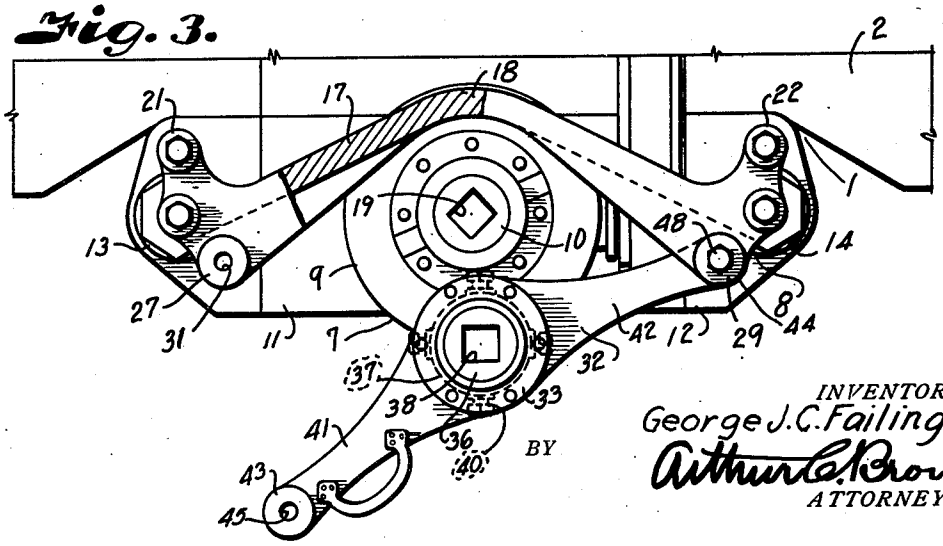


Fig. 3.



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Fig. 4.

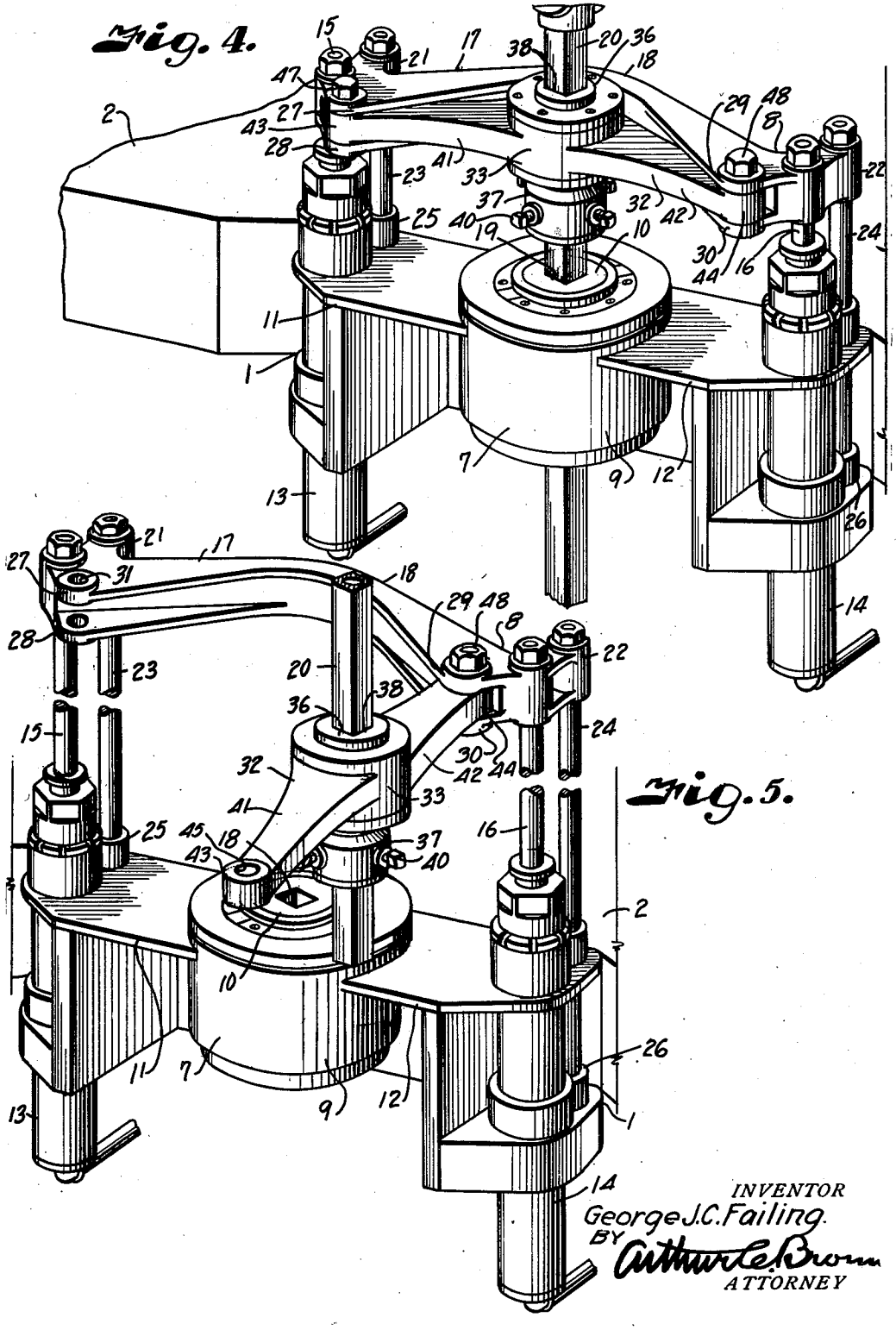


Fig. 5.

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Patented May 19, 1942 2,283,866

UNITED STATES PATENT OFFICE

2,283,866

DRILLING RIG

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Application July 19, 1939, Serial No. 285,258

10 Claims. (Cl. 255—22)

This invention relates to drilling rigs, particularly to those employing a drill feeding mechanism for controlling pressure on the drill bit, and has for its principal object to provide a simple and readily operable connection between the feeding mechanism and the Kelly rod of the drilling string, whereby the Kelly rod may be quickly moved to and from drilling position when it becomes necessary to add drill pipe sections or to withdraw the drilling string from the bore-hole.

In accomplishing this and other objects of the invention, as hereinafter pointed out, I have provided improved details of structure, the preferred form of which is illustrated in the accompanying drawings, wherein:

Fig. 1 is a side elevational view of the rear portion of a drilling rig embodying the feature of the present invention and showing a portion thereof in vertical section to illustrate engagement with the Kelly rod.

Fig. 2 is a plan view of the rear portion of the drilling rig.

Fig. 3 is a detail plan view of the Kelly rod connecting member of the feeding mechanism being moved away from drilling position.

Fig. 4 is a detail perspective view of the drill rotating and feeding mechanism showing the Kelly rod connected therewith.

Fig. 5 is a similar perspective view showing the Kelly rod connecting member when moved out of drilling position to carry the Kelly rod out of the way of the drill pipe handling operations.

Fig. 6 is a detail section on the line 6—6 of Fig. 2.

Referring more in detail to the drawings:

1 designates the rear portion of a drilling rig such as used in drilling shallow wells, the taking of cores, drilling of shot-holes, and performing similar oil field operations. The drilling rig illustrated is of portable character and is mounted upon a platform 2 carried upon the frame 3 of a motor vehicle 4. Supported on the platform 2 is the usual mast 5, winding drum 6, and other appliances necessary in drilling a bore-hole. Mounted at the rear of the platform is a drill rod rotating mechanism 7, and a drill rod feeding mechanism 8.

The parts above mentioned may be of any conventional construction, but in the drawings, the drill rotating mechanism is shown as comprising a cylindrical housing 9 in which is rotatably mounted a Kelly rod drive bushing 10, and which is driven from the power plant of the motor vehicle through suitable gearing as in conventional practice.

Extending laterally of the housing 9 are wing-like arms 11 and 12 carrying hydraulic cylinders 13 and 14 of the feeding mechanism 8. Slidable in the cylinders are the usual pistons (not shown), to which are secured rods 15 and 16, having their upper ends connected by a yoke 17. The yoke 17 includes a rearwardly curved, off-set portion 18, intermediate the cylinders, so that the yoke clears the Kelly rod opening 19 of the bushing 10, and allows ample clearance for pulling and running in sections of drill pipe when the Kelly rod 20 is removed therefrom as later described.

Formed at the ends of the yoke are ears 21 and 22, to which are connected guide rods 23 and 24 located in parallel relation with the piston rods 15 and 16 and having sliding bearing within tubular guides 25 and 26 carried by the wings 11 and 12. Formed on the opposite side of the yoke are pairs of spaced flanges 27—28 and 29—30, having registering openings 31 therethrough to pivotally secure a Kelly rod chuck carrier and connecting member 32, as now to be described.

The Kelly rod connecting member is of substantially bar shape, and has its central portion provided with a ring-like housing 33, carrying antifriction bearings 34 and 35 therein to journal a sleeve-like spindle 36 of a chuck 37. The spindle 36 has an axial bore 38 adapted to align with the bore 19 of the drive bushing and wherethrough the Kelly rod 20 is passed when it is connected to the drilling string. The chuck 37 may be of any conventional design but is here shown as including sets of jaws 39 adapted to grippingly engage the Kelly rod upon adjustment of the screws 40 and whereby the Kelly rod is adapted to be raised or lowered responsive to actuation of the pistons in the respective hydraulic cylinders so that pressure may be applied on the drilling string to promote cutting operation of the bit, or relieved therefrom when the weight of the drilling string is excessive for favorable drilling operation.

Extending laterally from the sides of the ring-like housing are arms 41—42, having sleeve portions 43 and 44 at the ends thereof. The sleeve portions are provided with bores 45 adapted to register with the openings 31 previously mentioned. The sleeve-like portions are such as to fit snugly between the ears 27—28 and 29—30 to form hinge joints whereon the bar-like member is adapted to swing as later described, and whereby it is retained in fixed relation with the connecting yoke 17. The shape of the arms and the

location of the hinge connections are such that the bore of the chuck spindle axially aligns with the opening in the drive bushing so that when the drilling string is made up, the Kelly rod 20 is adapted to be freely passed therethrough as shown in Fig. 1, the connecting member being retained by hinge pintles, such as headed pins 47 and 48, extending through the respective openings as best shown in Fig. 6.

During drilling operations the connecting member is fixed within the ears of the connecting yoke, and the Kelly rod is passed through the chuck and drive bushing to connect with the drilling string, the Kelly rod being secured to a swivel head 49 suspended from the top of the mast by tackle as indicated by the bails 50, Fig. 1. At the start of drilling, the lower end of the Kelly rod is engaged within the drive bushing so that it is adapted to be rotated thereby. The pistons of the hydraulic cylinders are in the upper ends of the cylinders and the chuck is grippingly engaged with the Kelly rod.

When a pressure medium is admitted to the upper ends of the respective cylinders the pistons are moved downwardly to apply pressure on the drilling string through the connecting member 39 and chuck 36 which is carried thereby. When the pistons reach the bottom of the cylinders, the chuck is loosened from the Kelly rod and the pistons are raised by admitting pressure medium to the bottom of the cylinders to carry the chuck upwardly to a new position with respect to the Kelly rod. Upon retightening of the chuck and again admitting pressure medium to the upper ends of the cylinders, the drilling pressure is reapplied to the drilling string while it is being rotated. This operation is repeated until the swivel approaches the rotating mechanism, whereupon it becomes necessary to apply another stand of drill pipe to the drilling string in the bore-hole. The chuck 36 is then loosened from gripping engagement with the Kelly rod, and the Kelly rod raised to the point where the lower end thereof passes above the top of the bore-hole. The pipe section connected therewith is then supported by a suitable spider or the like (not shown), while the Kelly rod is disconnected therefrom. While this operation is being performed, the yoke and connecting member of the drill feeding mechanism are preferably raised to their uppermost position, as shown in Fig. 5. When the Kelly rod is disconnected, it is raised freely through the chuck so that the lower end clears the drive bushing, whereupon one of the pintles 47 or 48 is removed and the connecting member 32 carrying the Kelly rod therewith is swung outwardly and away from the connecting yoke and to the side of the drilling and feeding mechanisms, as shown in Fig. 5. When in an out-of-the-way position, the Kelly rod may then be lowered through the chuck so the lower end thereof rests upon the ground, while the upper portion is supported by the connecting member. Another stand of drill pipe may then be readily lowered through the rotating mechanism, and connected with the upper end of the drilling string which is being supported by the spider, in a manner well known to those skilled in drilling operations. After the drilling string has been lowered so that the bit again engages the bottom of the bore-hole, the Kelly rod is raised within the chuck and the connecting member still carrying the Kelly rod is swung to drilling position alongside the connecting yoke, whereupon the pintle is reinserted to securely lock the connecting member to the yoke. The Kelly rod is then lowered through the drive bushing and again connected with the upper end of the drilling string. The chuck is again tightened so that the drilling operations may continue.

From the foregoing it is obvious that I have provided a simple and readily operable arrangement for handling the Kelly rod during running in or pulling out of the drilling string, and this is effected without providing other complicated mechanism for removing the rotating and feeding mechanisms out of position as usually is the case in drilling rigs of this character.

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

1. In a drilling rig, drill rotating means, hydraulic cylinders located on opposite sides of the drill rotating means, pistons in said cylinders, rods connecting the pistons, a yoke connecting the rods having a portion offset from the axis of the drill rotating means, a drill rod engaging member positioned in said offset, means movably connecting the drill rod engaging member with the yoke on one side of said offset, and means selectively securing the drill rod engaging member to the yoke on the other side of said offset to retain the drill rod in coaxial relation with said drill rotating means and releasable for bodily movement of the drill rod laterally away from said rotating means when the drill rod is withdrawn from said rotating means.

2. In a drilling apparatus, a drill rod rotating mechanism, hydraulic cylinders located on respective sides of said mechanism, piston rods slidable in the cylinders, a yoke connecting said piston rods, ears projecting from the yoke, and a chuck carrying member having pivotal connection with the ears at one end of the yoke and latch connection with the ears at the other end of the yoke, said chuck carrying member being arranged to swing said chuck to and from coaxial alignment with the drill rod rotating means.

3. In a drilling apparatus, a drill rod rotating mechanism, hydraulic cylinders located on respective sides of said mechanism, piston rods slidable in the cylinders, a yoke connecting said piston rods, pairs of ears projecting from the opposite ends of the yoke, and a chuck carrying member having pivotal connection between one pair of ears and latch connection with the other pair of ears, said member being arranged to swing said chuck to and from coaxial alignment with the drill rod rotating means.

4. In a drilling rig, a drill rotating means, hydraulic cylinders located on opposite sides of the drill rotating means, pistons in said cylinders, rods connected with the pistons, a yoke connecting the rods having a portion offset from the axis of the drill rotating means, spaced pairs of ears at the respective sides of the offset, a bar member having ends engaged between said ears, means hingedly connecting the bar member with one pair of ears, means removably securing the bar member to said other pair of ears to prevent swinging thereof on its pivotal connection, and a drill rod chuck rotatably supported by said bar member.

5. In an apparatus of the character described, drill rod rotating means having fixed support, drill rod feeding means including a pair of hydraulic cylinders disposed on opposite sides of said drill rod rotating means, piston rods movable in the cylinders, a yoke connecting said rods and having a central portion offset from the drill

rod rotating means, a chuck, a drill rod engageable by said rotating means and adapted to be engaged by the chuck, a spindle connected with the chuck, an arm having pivotal connection with the yoke on an axis offset laterally from the axis of rotation of said rotating means, means rotatably journalling the spindle in the arm independently of the yoke and with the axis of said spindle in coaxial relation with the rotational axis of said drill rod rotating means, and means for securing the arm from pivotal movement on the yoke and releasable to effect bodily movement of the drill rod away from the rotational axis of the rotating means while engaged by said chuck.

6. In an apparatus of the character described, a support, drill rod rotating means fixed on the support, a drill rod adapted to be engaged by the rotating means, drill rod feeding means fixed on the support relatively to the drill rod rotating means, a chuck connecting the drill rod with said feeding means, a yoke having fixed connection with the drill rod feeding means, a carrier, means rotatably journalling the chuck for fixed rotation in the carrier, and means hingedly connecting said carrier with the yoke for bodily swinging movement of the drill rod away from said drill rod rotating means when the drill rod is withdrawn from engagement therewith and while engaged by the chuck.

7. In an apparatus of the character described, a platform, drill rod rotating means mounted in fixed position on the rear of the platform, drill rod feeding means having fixed mounting on the rear of the platform at the sides of the rotating means, a drill rod extending through said rotating means, means for grippingly engaging the drill rod, a carrier rotatably mounting said drill rod gripping means, and means hinging the carrier to the feeding means, said hinging means having a length sufficient for bodily lateral movement of said gripping means and drill rod engaged thereby from coaxial alignment with said rotating means to a position away from the rear of said platform while the drill rod feeding means remains in its fixed position on the platform.

8. A drilling rig including, a mobile platform, drill rod rotating means mounted at the rear of the platform, arms extending laterally of the drill rod rotating means, power feed cylinders supported in fixed position on said arms, reciprocating members in said cylinders, a yoke connecting the reciprocating members and having an offset extending in a forwardly direction with respect to the platform to provide a clear space over the drill rod rotating means, an arm pivotally connected with the yoke at one side of said offset and provided with a ring-like housing adapted to swing in a horizontal plane to and from coaxial alignment with the drill rod rotating means, a sleeve-like spindle rotatably mounted in said ring-like housing, a chuck carried by the sleeve-like spindle, and means for releasably latching the arm to retain said chuck in coaxial alignment with the drill rod rotating means.

9. In a drilling rig, a mobile platform, drill rod rotating means having fixed support on the rear of the platform, drill rod feeding cylinders having fixed support relatively to the platform on opposite sides of the drill rod rotating means, reciprocating members in the cylinders, a yoke connecting said reciprocating members, an arm having pivotal connection relatively to one end of said yoke and latch connection relatively to the other end of said yoke, a ring-like housing carried by said arm and arranged in coaxial alignment with the drill rod rotating means, a sleeve-like spindle, antifriction bearings rotatably mounting said spindle in the ring-like housing and arranged to retain said spindle from axial movement within said housing, and a drill rod engaging chuck fixed to said spindle.

10. A drilling rig including, a mobile platform, a housing fixed to the rear of the platform, arms extending laterally of said housing, hydraulic cylinders carried by said arms, drill rod rotating means in said housing, pistons in said cylinders, rods connected with the pistons, a member connecting said rods, parallel guides fixed to said connecting member and having sliding support in said arms, a chuck carrier movably connected to said connecting member adjacent one of said rods, a chuck having fixed rotational support in said carrier, and means connecting said carrier with the connecting member adjacent the other of said rods.

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