No. 711,494. Patented Oct. 21, 1902.

A. B. GRIDER.

DEVICE FOR OVERCOMING DEAD CENTERS.

(Application filed Feb. 7, 1902.)

(No Model.)

Fig. 1.

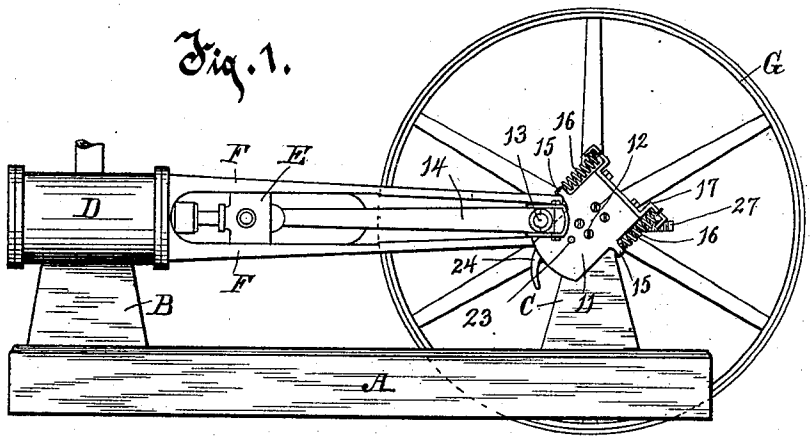


Fig. 2.

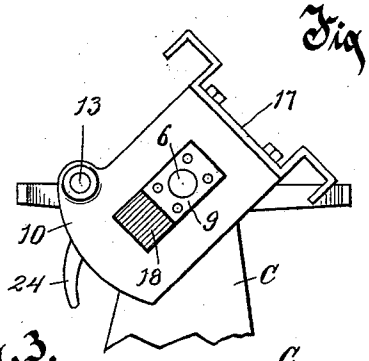


Fig. 3.

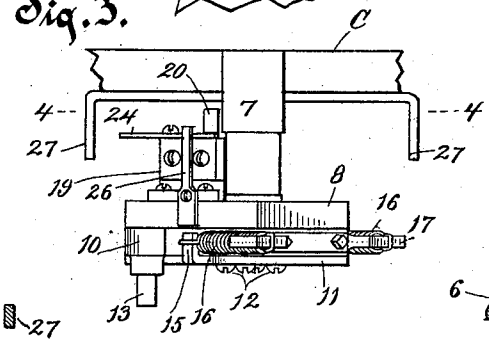


Fig. 4.

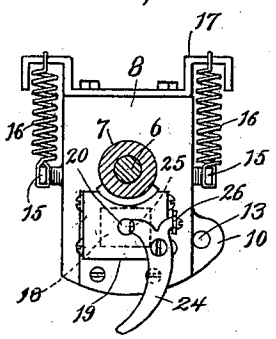
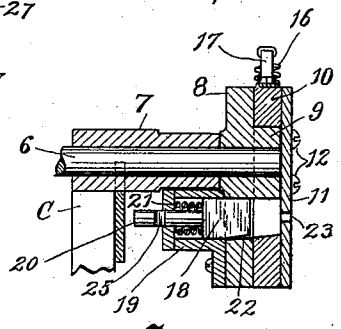


Fig. 5.



Witnesses.

C. H. Kaney.

Anna C. Faust.

Inventor.

Andrews B. Grider

By Benedict & Morsell

Attorneys.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

ANDREWS B. GRIDER, OF MILWAUKEE, WISCONSIN.

DEVICE FOR OVERCOMING DEAD-CENTERS.

SPECIFICATION forming part of Letters Patent No. 711,494, dated October 21, 1902.

Application filed February 7, 1902. Serial No. 93,101. (No model.)

To all whom it may concern:

Be it known that I, ANDREWS B. GRIDER, residing at Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented a new and useful Improvement in Devices for Overcoming Dead-Centers, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

The devices embodying my present invention are adapted for use in any mechanism where a change from a reciprocating movement to a rotary movement or the reverse is made, and as this change of motion usually occurs in connection with reciprocating engines I have illustrated devices embodying my invention in connection with a steam-cylinder and reciprocating piston and revolving shaft as a desirable form of illustrating the construction.

The present invention is practically an improvement on the invention covered by Patent No. 653,176, issued to me on July 3, 1900.

The invention consists of the devices and their combinations as herein described and claimed or the equivalents thereof.

In the drawings, Figure 1 is an elevation of a steam-cylinder with a reciprocating cross-head and my improved devices on the end of a shaft having a band-wheel. Fig. 2 is a front end view of my improved devices, the exterior cap being removed. Fig. 3 is a top plan view of my invention. Fig. 4 is a section on line 4 4 of Fig. 3 looking downwardly on that figure. Fig. 5 is a central section of my improved construction.

In the drawings, A is a base or bed provided with standards B and C. On the standard B there is a steam-cylinder D, provided with a reciprocating piston connected by its stem to a cross-head E, which travels back and forth in the guides F F. On the standard C a shaft is mounted, hereinafter more specifically referred to, which is provided with a band-wheel G.

A shaft 6 has a support in the bearing 7, fixed on the top of the standard C. This shaft is provided with a rigid head-block 8, having as a part thereof, on its outer surface, a guide-block 9, which guide-block has parallel sides and is advisably in parallelogram form having right angles. The guide-block 9 projects from the otherwise flat end surface of the head-block 8, and a crank-arm 10, provided with an elongated slot having parallel side walls, fits movably on the outer surface of the head-block 8 and against the parallel sides of the guide-block 9. The elongated slot in the crank-arm 10 is longer than the guide-block 9, so as to permit of movement of the crank-arm endwise on the head-block in the direction of the parallel sides of the guide-block 9. The guide-block 9 and the crank-arm 10 are of the same thickness, so that their outer surfaces are flush with each other. A cap-plate 11 fits on the end of the guide-block 9 and over adjacent portions of the crank-arm 10 and is secured to the guide-block, conveniently by screws 12 12. This construction secures the crank-arm in place on the head-block and permits of its reciprocating movement thereon alongside the guide-block 9. The crank-arm 10 is provided with a wrist-pin 13, to which a connecting-rod 14 may be jointed in the manner shown in the drawings. The cap-plate 11 is provided with fingers 15, to which coiled-wire springs 16 are anchored, which springs are also connected to lugs or the projecting ends of a bar 17, secured to the crank-arm 10. In this construction the springs 16 are normally contracted, holding the crank-arm 10 in the position shown in Figs. 1 and 2, in which the wrist-pin 13 is at its greatest distance from the shaft 6, which is the position of the crank-arm with reference to the shaft when in operation normally. The construction is, however, such that if the crank-arm and connecting-rod 14 come to a stop on a dead-center or in right line with the movement of the cross-head E then if the piston be started the springs 16 yield, permitting the crank-arm to slide on the head-block, putting the wrist-pin out of the line of the dead-center, thereby putting the radial force on the wrist-pin at such angle to the shaft as to readily start the rotary movement of the shaft. Thereupon the springs will contract and bring the crank-arm back to its normal position, in which the wrist-pin 13 is at its greatest radial distance from the shaft.

The construction just described is substantially that covered by my Patent No. 653,176. Some difficulty has been found with this con-

struction when the load is too heavy, which difficulty consists chiefly in the yielding of the springs 16 under such stress of work and permitting the crank-arm 10 to slide or reciprocate to some extent on the head-block during regular work, which sliding movement is undesirable. To obviate this, my present invention is directed chiefly to providing a means for locking the crank-arm 10 in its normal position during regular work or the continuous movement of the shaft, providing, however, for releasing the lock when the device is standing still, so that it can operate even if at a dead-center when the mechanism is to be started. For this purpose I provide a bolt or locking-block 18, which fits movably in a transverse aperture therefor in the head-block 8 and also in a housing 19, secured to the head-block 8 at the rear thereof. This locking-block 18 is in cross-section substantially of the size and form of the space in the slot in the arm 10 at one end of the guide-block 9 when the parts are in the positions shown in Figs. 2 and 5. The purpose of this block is to be thrust forwardly from the position shown in Fig. 5, where it is in the head-block, into the space or recess in the crank-arm at the end of the guide-block, so that when in this position it will prevent the movement of the crank-arm reciprocatingly on the head-block. The locking-block is provided with a rearwardly-extending stem 20, which passes through the cap or cover of the housing 19, and a coiled-wire spring 21, about the stem and bearing on the block and against the cover of the housing, is adapted to force the block yieldingly forward into the space in the crank-arm. The block is advisably provided with a beveled side 22, adapted to fit wedgingly on a correspondingly-beveled wall of the slot in the crank-arm 10, whereby the block at first does not pass entirely across the crank-arm; but as the parts become worn it advances farther, always fitting snugly into the space therefor between the end of the guide-block 9 and the opposite wall of the slot in the crank-arm.

When the crank mechanism is at rest, the attendant inserts a small pin or rod through the aperture 23 in the cap-plate 11 against the front end of the block 18 and pushes it back into the position shown in Fig. 5, in which it is entirely out of the path of movement slidingly of the crank-arm 10 on the head-block 8. A latch 24, pivoted on the outer wall of the housing 19, is adapted to take into a notch 25 in the stem 20 of the block and hold the block detachably in the position shown in Fig. 5. This latch 24 is held yieldingly in engagement with the stem 20 by a flat spring 26, secured to the housing and bearing on the latch. The locking-block 18 being thus removed from the path of the crank-arm 10 on the head-block 8 and secured releasably against the expansive force of the spring 21, the device is in condition to permit the crank-arm to slide on the head-block for moving the wrist-pin out of the dead-center at starting, and thereupon, the rotating motion being started, the latch 24 contacts with a tripping-arm 27, which is secured to the standard C and is so disposed as to be in the path of the latch when it is in engagement with the stem 20. By this contact of the latch 24 with the tripping-arm 27 in passing it the latch is tilted sufficiently to release it from the notch in the stem 20, and thereupon the spring 21 forces the locking-block 18 forward into the space in the crank-arm 10 at the rear of the guide-block 9, locking the parts in place. This condition continues until the attendant again forces the locking-block out of the space in the crank-arm by means of a pin put through the hole 23. The tripping-arm 27 is advisably projected into the path of the latch 24 at both sides of the shaft 6, so as to be in proper position for tripping the latch immediately after starting from a dead-center with the wrist-pin at either side of the shaft. The latch 24 normally rests on the stem 20 outside of the notch therein, and when in this position the distant end of the latch passes the tripping-arm without touching it when the shaft rotates.

What I claim as my invention is—

1. The combination with a rotatable shaft, a crank-arm mounted on the shaft yieldingly and so as under excess strain to be capable of moving laterally limitedly past the shaft in an oblique angle to the line of the wrist-pin and the shaft, of a locking-block adapted to lock the parts in position releasably.

2. The combination with a rotatable shaft, a crank-arm mounted on the shaft yieldingly and so as under excess strain to be capable of moving laterally limitedly past the shaft in an oblique angle to the line of the wrist-pin and the shaft, and means for retrieving the crank-arm when excess of strain thereon has ceased, of a locking-block adapted to lock the parts in position releasably.

3. In combination with a rotatable shaft, a crank-arm mounted on the shaft yieldingly and so as under excess strain to be capable of moving laterally limitedly past the shaft in an oblique angle to the line of the wrist-pin and the shaft, a sliding block adapted to lock the parts releasably in relative position, a spring adapted to hold the locking-block up to its work, and means for holding the block in released position against the action of the spring.

4. In combination with a rotatable shaft, a crank-arm mounted on the shaft yieldingly and so as under excess strain to be capable of moving laterally limitedly past the shaft in an oblique angle to the line of the wrist-pin and the shaft, a sliding block adapted to lock the parts releasably in relative position against such sliding movement, a spring adapted to hold the locking-block up to its work, a latch adapted to engage a part of the block and hold it in released position against the action of its spring, and a spring adapted

to hold the latch in engagement yieldingly with the block.

5. The combination with a rotatable shaft, a crank-arm mounted on the shaft slidably in an oblique angle to the line of the wrist-pin and the shaft, of a sliding block adapted to lock the parts in relative position against sliding, a spring adapted to holding the locking-block up to its work, a latch adapted to engage a part of the block and hold it in released position against the action of the spring, a spring adapted to hold the latch in engagement yieldingly with the block, and a tripping-arm disposed when the shaft is rotated to contact with and release the latch from engagement with the locking-block.

In testimony whereof I affix my signature in presence of two witnesses.

ANDREWS B. GRIDER.

Witnesses:
ANNA V. FAUST,
C. T. BENEDICT.