

H. C. BRADFORD.

Crank-Movements.

No. 135,073.

Patented Jan. 21, 1873.

Fig. 1.

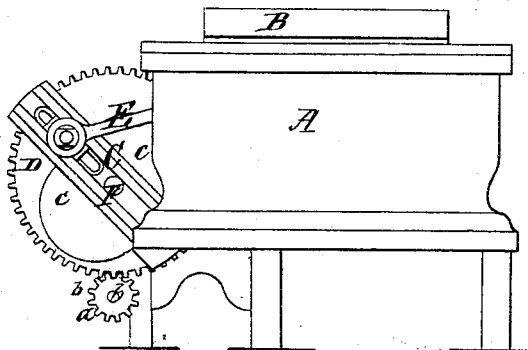


Fig. 3.

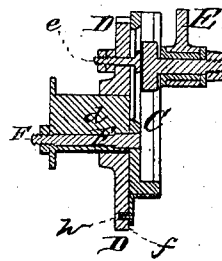


Fig. 2.

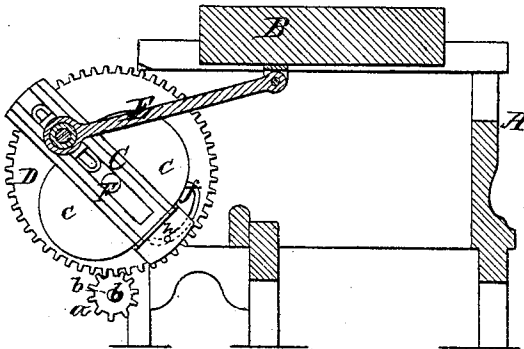
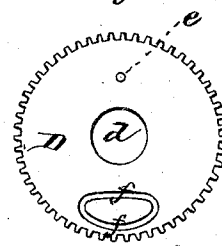


Fig. 4.



Witnesses.
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UNITED STATES PATENT OFFICE.

HORACE C. BRADFORD, OF PROVIDENCE, RHODE ISLAND.

IMPROVEMENT IN CRANK MOVEMENTS.

Specification forming part of Letters Patent No. **135,073**, dated January 21, 1873.

To all whom it may concern:

Be it known that I, HORACE C. BRADFORD, of the city and county of Providence, in the State of Rhode Island, have invented a certain new and useful Improvement in Quick-Return Crank Movements, which is applicable to planers, shapers, punching-machines, and other mechanical structures in which a slow advance movement is required and a quickened return movement desired.

My invention pertains to that class of quick-return crank motions which characteristically embody a crank-arm, which is mounted on and revolves with a face-plate, and which depends for its automatic radial movement to and from the axis of the face-plate upon a center-pin, which, while it revolves on its own axis, is otherwise stationary, and around which eccentrically the face-plate on its own axis is revolved. My invention consists in combining with the automatic reciprocating crank-arm, the center-pin, and face-plate a certain semi-elliptic auxiliary bearing, which constitutes a connecting-medium between the crank-arm and the face-plate, whereby the strain and wear on the center-pin are greatly lessened, the several parts rendered correspondingly more durable, and the general efficiency of the machine with which it is employed materially augmented; and I do hereby declare that the following specification, taken in connection with the drawing furnished and forming a part of the same, is a clear and true description of my invention, and a practical method of applying the same to a machine with which it has a fully-demonstrated value.

Referring to the drawing, Figure 1 represents in elevation the frame and bed of a hand-planer provided with my improved quick-return crank motion. Fig. 2 represents the same in longitudinal vertical section. Fig. 3 represents in section the crank motion complete, but detached from the machine. Fig. 4 represents the face-plate gear removed from the machine and the crank-arm detached therefrom.

A denotes the frame of the planer, and B denotes the sliding bed or carriage, on which the piece of metal to be planed is secured. As my invention pertains only to this part of the machine other parts are not shown. C denotes the automatically-variable crank-arm. It is provided with bearing-wings *c*, one on each

side. In this instance the arm is shown as if provided with an adjustable slotted crank-pin connection. D denotes the face-plate. It is in this instance combined with and is in fact a part of the driving-gear, with which the pinion *a* on the hand-crank shaft *b* engages. E denotes the pitman, which connects the crank-arm with the sliding bed B. The crank-arm C is united to the face-plate D, and the latter is secured to its axis *d* by the center-pin F, which passes loosely through the axis *d* and the face-plate, and is firmly fastened to the crank-arm. The parts as thus far described and arranged resemble certain quick-return crank motions which have been applied to hand-planers constructed by me for several years past, and they, therefore, involve no features of patentable novelty. It will readily be understood that by revolving the face-plate gear the crank-arm C will be carried with it, after the manner of the usual crank-arm; also, that during every complete revolution the crank-arm will be automatically advanced and withdrawn from and to the center of the axis around which the face-plate revolves; and also that the extent of the radial movement of the crank-arm depends solely upon the distance between the true axis of the center-pin and the face-plate axis *d*; and, still further, that all the strain of the crank movement must necessarily be borne by the center-pin F. It will also be readily understood that the outer end of the crank-arm will alternately be swung first in advance of the movement of the face-plate and then behind the said movement, and that this rocking is effected on the steady-pin *e*, which loosely engages with a slot in the crank-arm. The inner end of the crank-arm during every revolution of the face-plate also describes a line which may be described as the upper half of an ellipse divided longitudinally, as illustrated in Fig. 4. The semi-elliptical groove *f* is cut in the side of the face-plate gear, in lines corresponding with the "throw" of the end of the crank-arm and also with its radial movement. The crank-arm has a projecting pin, *h*, on its rear side, which enters and loosely occupies the groove *f* in the face-plate. The entire portion of the semi-elliptical groove is traversed by the pin *h* during every revolution of the face-plate. The curved portion of the slot corresponds fully with the

radial movement of the crank-arm, and the straight portion corresponds with the swinging movement.

The desirable proportions and curves of the semi-elliptical groove, of course, can be mathematically ascertained and stated. They can be arrived at by the following mechanical method: The face-plate and crank-arm are put together, as in the usual way. A hole is drilled through the inner end of the crank-arm, which is to subsequently receive the pin *h*. A carefully-pointed instrument, exactly fitting said hole, is then inserted therein, and made to bear against the side of the face-plate while the plate is revolved. By this means the true center line of the groove will be described. In building new machines, of course, the groove, however determined, can be cast in the face-plate and subsequently finished.

It will be readily observed that the pin *h* and the groove can be made to perform a portion of the labor heretofore solely devolving upon the center-pin, and that the crank-arm is more evenly held to the face-plate while at

work than if the strain was borne entirely by the center-pin.

The construction of the pin and groove may be somewhat varied and still produce the same practical results. For instance, instead of the groove in the face-plate a raised semi-elliptical cam-edge may be employed, with a bifurcated swiveled pin to embrace it instead of the simple pin *h*. I do not, therefore, limit myself to the precise construction shown, as the semi-elliptical auxiliary bearings constitute the novel feature of my invention.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

The combination of the semi-elliptical auxiliary bearings *f h* with the rotary face-plate, the automatically reciprocating crank-arm, its center-pin, and steady-pin, substantially as and for the purposes specified.

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Witnesses:

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