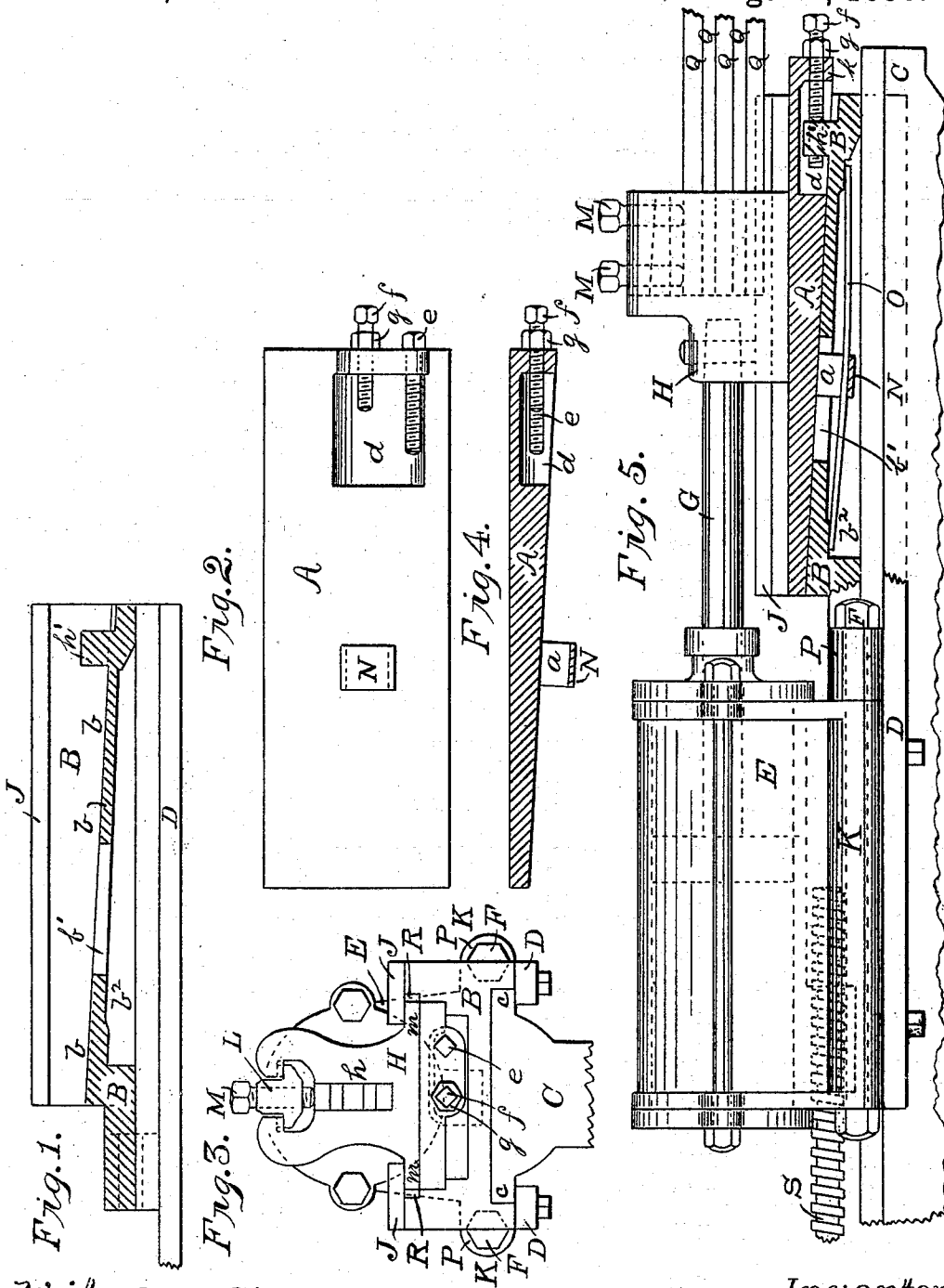


(No. Model.)

A. BALL.
GUIDE FOR THE CYLINDERS AND CROSS HEADS OF STONE QUARRYING
MACHINERY.

No. 503,691

Patented Aug. 22, 1893.



Witnesses:
O. L. Dorsey
Wm. J. Martin.

Inventor:
Albert Ball.
By Kay, Totten & Hooker,
Attorneys.

UNITED STATES PATENT OFFICE.

ALBERT BALL, OF CLAREMONT, NEW HAMPSHIRE, ASSIGNOR TO THE
SULLIVAN MACHINERY COMPANY, OF SAME PLACE.

GUIDE FOR THE CYLINDERS AND CROSS-HEADS OF STONE-QUARRYING MACHINERY.

SPECIFICATION forming part of Letters Patent No. 503,691, dated August 22, 1893.

Application filed October 12, 1892. Serial No. 448,621. (No model.)

To all whom it may concern:

Be it known that I, ALBERT BALL, a resident of Claremont, in the county of Sullivan and State of New Hampshire, have invented a new and useful Improvement in Guides for Cylinders and Cross-Heads in Stone-Quarrying Machinery; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to certain improvements in guides for the cylinder and cross head of rock or stone channeling or quarrying machinery. This class of machinery operates by steam or other like power, the cutting chisels or drills being connected to the cross head of the engine or motor and rapidly reciprocated thereby so as to cut the desired course, such, for example, as a channel, and the engine operating the cutters being itself advanced by suitable mechanism as the cutting proceeds so as to bring the cutters which have once traveled over a certain course in such position that in their next path along the course or kerf they will cut deeper into the rock. As these machines have heretofore been built, the cylinder of the engine and the cross head connected to the piston and operated thereby have been mounted on the same guides, as it was necessary to advance the cylinder according to the cut made. The cross head, of course, reciprocated very rapidly, while the cylinder moved along the course slowly, the one reciprocating at from two hundred and fifty to three hundred strokes per minute, while the other was reciprocated or moved along the guide-ways only once for the full depth of the cut or channel made with that cutter or gang of cutters. As a result, the part of the guide on which the cross head operated was necessarily worn away much more rapidly than the upper part of the guide on which the body of the cylinder ordinarily moved, and if the cylinder guides were adjusted to fit the upper part of the guide-way, when the cylinder was brought to the lower part thereof, the guide-way was too loose and permitted the shaking or vibration thereof, while if the guide-ways were kept tight enough for the cross head they were too tight for the cylinder, and the latter would bind when fed down into the portion of the

guide-way where the cross head had been running. With mechanism sustaining the rapid movement of the engine necessary in these channeling or quarrying machines, it is evident that the parts must be held so as to prevent any vibration of the parts, both because of the rapid movement of the engine and cutters operated thereby, and because of the jar brought upon such machinery by the blow struck by the cutter, such vibration leading to the loosening of the other parts and bringing unnecessary strain and wear upon the parts of the mechanism.

The uneven wear of the guiding mechanism for the cylinder and cross head has been one of the greatest difficulties found in this class of machines, and the present invention is intended to overcome this difficulty. To these ends I provide an independent or separate guide for the reciprocating cross head traveling with the cylinder on the main guide on which the cylinder travels, so that the wear from the rapid movement of the cross head comes upon this cross head guide, while the main guide for the cylinder receives no such wear and can be adjusted to support the cylinder firmly and permit its movement for the entire length of the guide-way without permitting unnecessary vibration thereof, and the wear from the rapid movement of the cross head is taken up on a small part of the mechanism which can be replaced at small cost, instead of wearing into the main guide for the cylinder.

My invention also consists in certain other improvements relating to the guide for the cross head and the taking up of the wear thereon, as will be more fully hereinafter set forth and claimed.

To enable others skilled in the art to make and use my invention, I will describe the same more fully, referring to the accompanying drawings in which—

Figure 1 is a longitudinal section of the traveling guide. Fig. 2 is a bottom view of the tapering key or gib for taking up wear on the traveling guide. Fig. 3 is an end view of the frame and cross head, illustrating the position of the two guides and the parts mounted thereon. Fig. 4 is a sectional view of the tapering gib; and Fig. 5 is a side view

partly broken away, showing the relative position of the cylinder and traveling guide, and means for adjusting the tapering gib, as will be hereinafter described.

5 Like letters of reference indicate like parts in each of the views.

In the accompanying drawings C illustrates what may be termed the standard or cylinder guide, being the guide on which the cylinder is mounted and along which the cylinder is fed as the cutting proceeds, such cylinder guide being either held rigid on the channeling machine and moving with that machine, or having any desired movement upon the machine on which it is carried, according to the cut which is to be made. On this guide C is mounted the cylinder E, said cylinder having a seat to receive said guide, and being confined upon the cylinder guide by the 10 guide plates or ribs D which are carried by the cylinder body and extend inwardly under the ribs *c* of the cylinder guide C. The cylinder is moved upon the standard by any suitable means, such as the screw S, which 15 may be operated by hand or power, as desired.

Connected to the cylinder E is the cross head guide B, such cross head guide traveling with the cylinder and always being held in such relative position thereto that the cross head H may be reciprocated upon such traveling guide, and such traveling guide B receives practically all the wear from the rapid reciprocation of the cross head. The traveling guide B is shown as attached directly to the cylinder E by means of the bolts F passing through the projections P on the traveling guide and the projections K on the cylinder E, the two parts being thus rigidly connected together. If desired, the traveling guide B and cylinder E can be made in one piece. 20 The traveling guide B also fits upon the standard or cylinder guide C and the guide plates D extend along both the cylinder body and the body of the traveling guide, and are connected thereto by suitable bolts. The cross head H is connected to the piston within the cylinder E by the piston rod G, and said cross head also acts as a clamp for the drills or chisels Q which are held therein by any 25 suitable means, that shown being the clamp block L engaging with lips upon the cross head and clamp and provided with set screws M which pass through the clamp and bear upon the chisels in the seat *h* formed in the cross head therefor. The clamping mechanism shown forms the subject matter of another application filed by me, Serial No. 455,190. The cross head and clamp H is held upon the traveling guide B by means of the 30 guide plates J which extend inwardly over the side ribs or lips *m* to confine the cross head in the traveling guide. The side faces of such lips *m* are also guided by the side gibs R formed as part of the guide plates J which fit in seats within the body of the traveling guide and which may be adjusted by 35 any suitable mechanism.

In the construction of the channeling engine heretofore in use, the gibs for taking up wear have been arranged upon the reciprocating cross head carrying the chisels, this being considered necessary because the long guide-way on which the cylinder was mounted could not be made adjustable to take up the wear. As a result of such construction, such 40 gibs were reciprocated at the full speed of the engine and were liable to be quickly shaken loose so that it was very difficult to hold the parts firmly to place. By my present invention this difficulty is overcome, as I am enabled 45 to provide a key or gib upon the cross head guide which takes up the wear of such cross head and which itself moves only according to the movement of the cross head guide, so that such difficulty of the loosening of parts by 50 such rapid movement is overcome. For this purpose the lower face *b* of the traveling guide B is made inclined to receive the tapering gib or wedge A which rests upon the inclined base *b* fitting within suitable seats 55 in the traveling guide, and is arranged to be adjustable therein so as to take up the wear of the cross head. For this purpose the tapering gib A has the seat or depression *d* in the under face thereof into which the nut or 60 threaded lug *h'* enters, and extending through the end of the tapering gib A are the bolts *e*, *f*, the bolt *e* screwing into the nut *h'* on the traveling guide so as to provide for the movement of the tapering gib upwardly along the 65 inclined face *b*, while the bolt *f* bears against the nut *h'* so as to lock it by pressure opposite to that of the bolt *e*, a check nut *g* also being provided upon the bolt *f* to lock it after the parts are adjusted. In order to hold 70 the tapering gib or wedge A down upon the inclined face *b* of the traveling guide, I provide the same with the lug N which extends through a slot *b'* in the inclined face *b* of the traveling guide B and into the space *b²*, in 75 the under part of the traveling guide B. The lug N has the opening *a* formed therein and through the same is passed the spring O which rests within the space *b²* and bears on the upper wall thereof, so exerting a spring action upon the tapering gib to hold it upon the 80 inclined guide-way *b* and prevent vibration thereof. Tapering gibs, such as described, may be employed in duplicate, if desired, such as under each flange *m* of the cross head. 85

In the use of the invention, suitable connections are made with the cylinder or motor E, which are, of course, flexible whether for steam, air or electricity, so as to permit the sliding movement of the motor on the standard or cylinder guide C. After the parts have been adjusted to the desired position, according to the cut or channel to be made, steam or other suitable fluid is admitted to the cylinder, and through the piston and the piston rod a rapid reciprocating stroke is imparted to the cross head and clamp H which acts through the chisels or tools carried by the clamp to cut the kerf desired by means of short, 90 95 100 105 110 115 120 125 130

quick, blows. As the cutting proceeds, the cylinder E and the sliding guide B carried thereby are moved slowly along the cylinder guide C by any suitable adjusting means, for example, by the screw S which may be operated by hand or suitable automatic mechanism. As the cross head and clamp reciprocates, it moves in a regular course upon the sliding guide B without reference to the position of the cylinder upon the cylinder guide, the wear from the rapid movement of the cross head or from the strain of blows struck by the tools being brought entirely upon the traveling guide, and the cylinder guide simply acting as a guideway for the slow movement of the cylinder and the traveling guide carried thereby, so that practically all wear upon the main or cylinder guide is overcome, and in case of such wear upon the guide for the cross head as would require the replacing of the same, but a small part of the mechanism needs to be replaced which can be done at little cost. In case of the wear of the sliding guide or of the cross head, the principal part of such wear can be quickly taken up by the adjustment of the tapering gib or wedge A, it only being necessary for the operator to loosen the check nut *g* and set screw *f* and turn the set screw *e* so as to draw the wedge A up the inclined face *b* of the sliding guide to properly adjust the relative positions of the cross head and the guide faces on the traveling guide *b*, and then to lock the parts in place by forcing the screw *f* against the nut *h'* and locking the same in position by the nut *g*. In such case, the lug N slides over the spring O and said spring always acts by the pressure exerted on the wedge A to hold it down to its place and prevent vibration thereof. As the tapering gib A simply moves with the cylinder, it has only a very slow movement, and there is no such jar or vibration of parts imparted thereto as would tend to loosen the parts.

The construction illustrated in the drawings is found by me to be well adapted for the purpose, but it is evident that different forms of guides may be employed, the broad feature of the present invention being the guide for the cylinder and the independent guide carried by the cylinder for the reciprocating cross head, and this is intended to be broadly included within the present invention.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of a standard or main motor guide and a motor mounted on said guide, a traveling guide on said main guide, and a reciprocating cross head connected to and moving with the reciprocating rod of the motor and mounted on said traveling guide, substantially as set forth.

2. The combination of a standard or main motor guide and a motor mounted on said

guide, a traveling guide connected directly to and adapted to move with the motor body, and a reciprocating cross head connected to and moving with the reciprocating rod of the motor and mounted on the traveling guide, substantially as set forth.

3. The combination of a standard or main motor guide, a motor mounted on said guide, a traveling guide mounted on the main guide, a reciprocating cross head connected to and moving with the reciprocating rod of the motor and mounted on said traveling guide, and a gib carried by the traveling guide for taking up wear on the cross head, substantially as set forth.

4. The combination of a motor, a guide connected directly to the motor body and having an inclined face, a reciprocating cross head mounted on said guide and connected to the reciprocating rod of the motor, and a tapering gib on the cross head guide fitting between the inclined face of said guide and the cross head body to take up wear, substantially as and for the purposes set forth.

5. The combination of a motor, a cross head guide having an inclined face, a cross head mounted thereon and connected to the reciprocating rod of the motor, and a tapering gib fitting between the inclined face of the guide and the cross head body to take up wear, said gib having the screw *e* engaging with the nut *h'* on the cross head guide and the set screw *f* and check nut *g*, substantially as and for the purposes set forth.

6. The combination of a motor, a cross head guide having an inclined face, a cross head mounted thereon and connected to the reciprocating rod of the motor, and a tapering gib fitting between the inclined face of the guide and the cross head body to take up wear, said cross head guide having a slot extending through its inclined face, and the tapering gib having a lug extending through such slot and engaging with a spring to hold the gib to such inclined face of the cross head guide, substantially as and for the purposes set forth.

7. The combination of the motor E, the cross head guide B having the inclined face *b*, slot *b'*, and recess *b''*, the cross head H mounted on the guide and connected to the reciprocating rod of the motor, the tapering gib A having the slotted lug N, and the spring O passing through such slotted lug and fitting within the recess *b''* of the cross head guide, substantially as and for the purposes set forth.

In testimony whereof I, the said ALBERT BALL, have hereunto set my hand.

ALBERT BALL.

Witnesses:

IRA COLBY,
GEO. E. WOLCOTT.