2 Sheets--Sheet 1.

A. VAN HAAGEN & C. VAN HAAGEN.

Improvement in Drilling-Machines.

No. 126,111. Patented April 23, 1872.

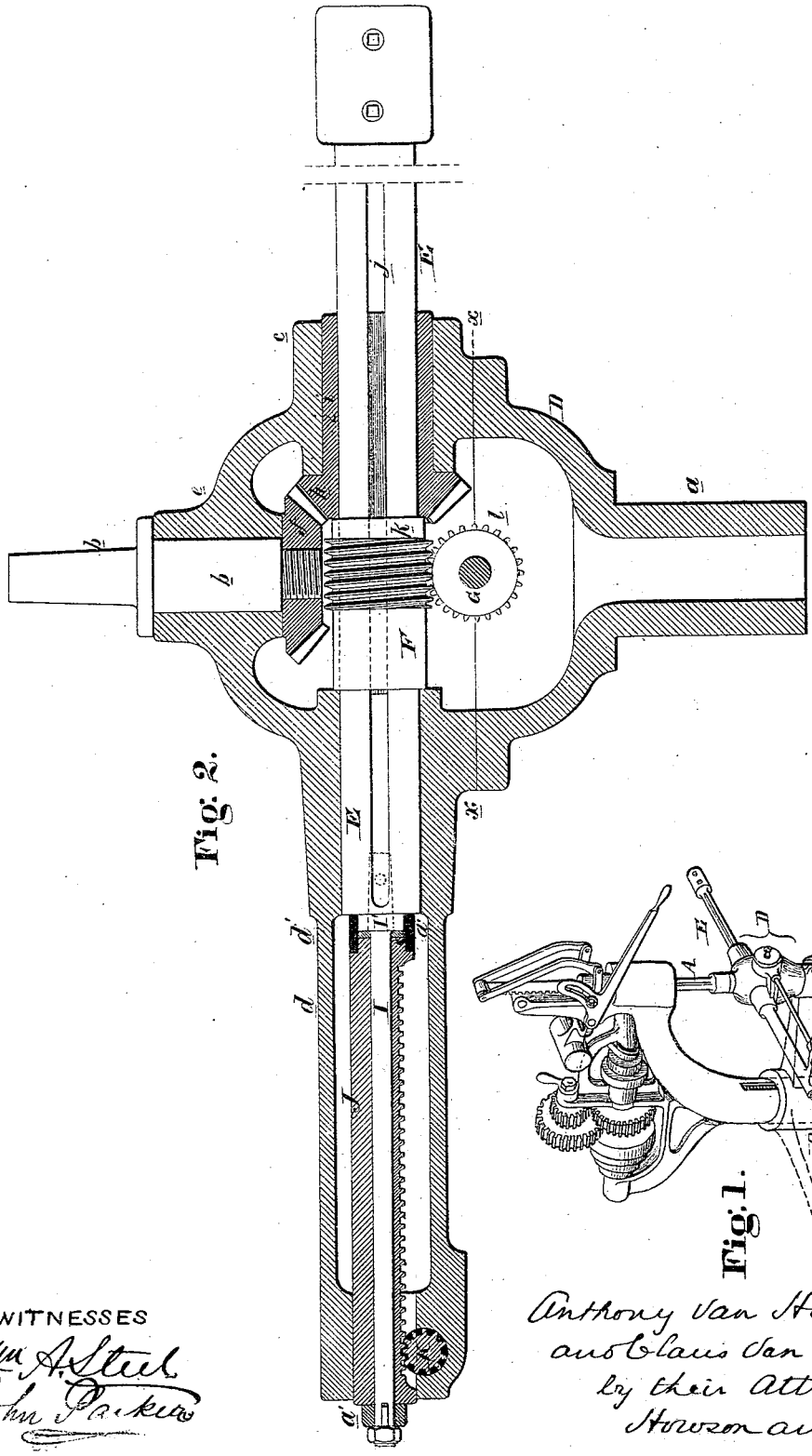

Fig. 2.

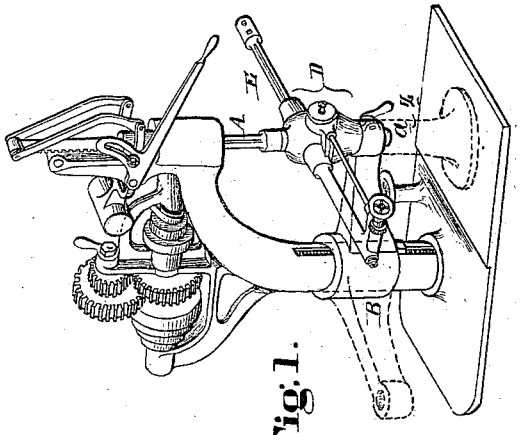

Fig. 1.

WITNESSES

Wm. A. Steel

Jno. Parker

Anthony Van Haagen
and Claus Van Haagen
by their Attys
Howson and Son

2 Sheets--Sheet 2.

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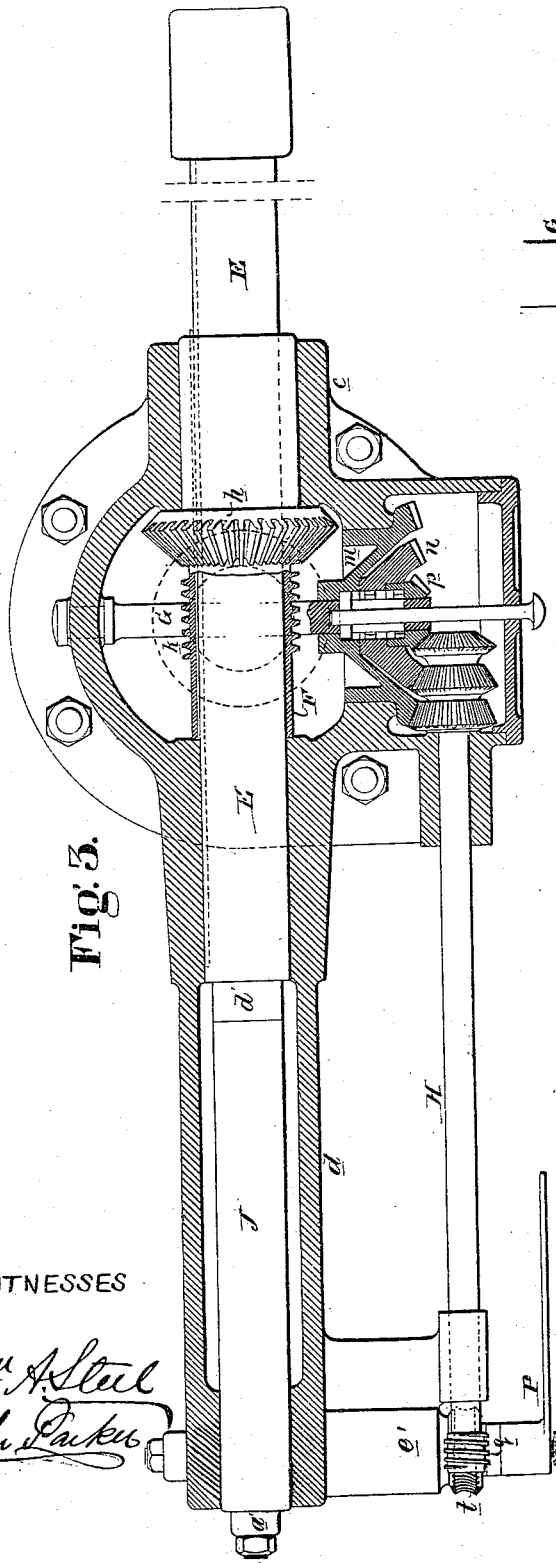

Fig. 3.

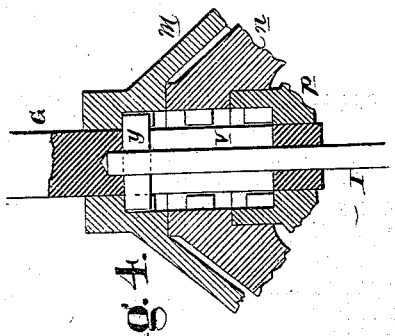

Fig. 4.

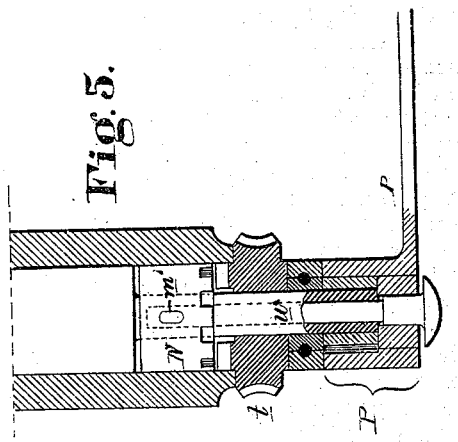

Fig. 5.

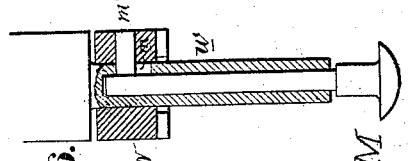

Fig. 6.

WITNESSES

Wm. A. Steel

John Parker

Anthony Van Haagen
and Claus Van Haagen
by their Attys.
Horizon Austen

126,111

UNITED STATES PATENT OFFICE.

ANTHONY VAN HAAGEN AND CLAUS VAN HAAGEN, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN DRILLING-MACHINES.

Specification forming part of Letters Patent No. 126,111, dated April 23, 1872.

SPECIFICATION.

We, ANTHONY VAN HAAGEN and CLAUS VAN HAAGEN, both of Philadelphia, county of Philadelphia, State of Pennsylvania, have invented an Improvement in Drilling-Machines, of which the following is a specification:

Our invention consists of an attachment to drilling-machines, the said attachment, which is too fully explained hereafter to need preliminary description, having for its object the conversion, when necessary, of a vertical drilling-machine into a horizontal drilling-machine. My invention further consists of the combination of the said attachment and an adjustable supporting bracket of the drilling-machine.

Figure 1, Drawing No. 1, is a perspective view of a vertical drilling-machine with our improvement. Fig. 2, a vertical section of our improved attachment for vertical drilling-machines. Fig. 3, Drawing No. 2, a vertical plan of the said attachment. Figs. 4, 5, and 6, detached views of part of our invention drawn to an enlarged scale.

The perspective sketch, Fig. 1, will serve to impart a general knowledge of the nature and object of our invention. This figure illustrates an ordinary vertical drilling-machine, such as is used in nearly all machine-shops, A being the revolving vertical spindle of the machine, and this spindle having at its lower end the usual enlargement and orifice for receiving the drills or drill-rods. B is the vertical adjustable bracket, which usually supports a table for receiving the object to be drilled. The use of machines of this class is restricted to vertical drilling, and when a horizontal hole has to be bored it is usual to employ a lathe, or a specially constructed and expensive horizontal drilling-machine for the purpose. By our attachment, however, an ordinary vertical drilling-machine may be readily converted into a horizontal drill. In order to effect this change the table is removed from the bracket B, and the cylindrical projection *a* of a casing, D, is introduced into a hole in the said bracket B, while the lower end of the vertical drilling-spindle A is fitted to the end of a vertical spindle which turns in the said casing, and from which a revolving motion is communicated, in the manner described hereafter, to a horizontal drill-spindle, E, which also turns in the said casing D, and as this casing can be turned on the bracket B, the drill of the spindle E can be adjusted to various angles suggested by the position of the object to be drilled. The altitude of the horizontal drill can also be varied at pleasure, for the brackets which support the tables of most of the vertical drills in use admit of being raised and lowered by a rack and pinion, or other equivalent devices, and the spindle A can be adjusted accordingly.

Having now pointed out the object aimed at by our invention, and given a general description of the mode of carrying the invention into effect, we will now proceed to explain minutely the detailed construction of our drilling attachment; and we may remark in the outset that many of these details are applicable to drilling and boring machines generally.

In Fig. 2, D represents the casing of the attachment, and consists of two parts united at the line *x x*, and this casing has four tubular projections, *a*, *c*, *d*, and *e*, the projection *a*, as before remarked, being adapted to a hole in the bracket B of the drilling-machine, and the projection *e* serving as the bearing for the vertical spindle *b*, the upper end of which fits into the spindle A of the drilling-machine, while the projections *c* and *d* serve as bearings for the horizontal drill-spindle E. A bevel-wheel, *f*, on the vertical spindle *b* gears into a like wheel, *h*, on or forming a part of the sleeve *i*, which turns in the projection *c* of the casing, and to this sleeve is adapted the drill-spindle E, the latter having nearly throughout its entire length a longitudinal groove, *j*, for receiving a key or feather in the sleeve *i'*, the groove also receiving a feather on a sleeve, F, on which is formed a worm, *k*, gearing into a worm-wheel, *l*, on a shaft, G, one end of which turns in the casing D, as seen in Fig. 3, the opposite end passing through a system of bevel-wheels, there being three wheels in the present instance, marked *m*, *n*, and *p*. The largest, *m*, of these wheels has a hub arranged to turn in the casing D, and the wheels are fitted within each other, as shown in Figs. 3 and 4. Each of the bevel-wheels has a separate pinion, the three pinions being secured to the shaft H, which turns in projections on the casing A, and which is furnished near the end with a worm, *q*, gearing into a worm-wheel, *t*, on a tubular spindle,

w, referred to hereafter. In the spindle G, before referred to, at a point where it passes through the wheels *m*, *n*, and *p*, there is an elongated slot in which a transverse key, *y*, can be moved to and fro, this key being attached to a sliding rod, I, which passes through the casing of the machine, so as to be operated from the exterior of the same. The key *y* projects on each side of the spindle G, and can be so moved that its projecting ends will catch against projections in the hub in any one of the three wheels. Into the rear of the drill-spindle E is secured the end of a rod, I, which passes through a tube, J, the latter passing through and being guided by, but being prevented from turning in, the end of the projection *d* of the casing A. The tube J is secured to the rod I between a collar, I′, on the same, and a loose collar, *a*′, which is confined both by a nut and pin to the rod, a suitable washer intervening between the collar I′ and the end of the hub J, and a sleeve, *b*′, embracing both the collar, tube, and washer. A rack is formed on the under side of the tube J, and into this rack gears a pinion, *k*, on the shaft *w*, previously referred to as carrying the worm-wheel *t*, the shaft turning in a projection, *e*′, at the end of the tubular projection *d* of the frame D. A spindle passes through the shaft *w*, Fig. 6, and this spindle is connected by a pin, *m*′, to a clutch block, N, the projections of which can be moved in or out of gear with the projections on the worm-wheel *t*, the said pin *m*′ passing through a slot, *m*, in the said shaft *w*. As the horizontal drill-spindle E is caused to revolve by the vertical drill-spindle A through the medium of the wheels *f* and *h*, the said drill-spindle E is fed forward by the action of the revolving pinion *k* on the rack of the tube J, this pinion deriving its motion from the drill-spindle through the intervention of the worm *k*, worm-wheel *l*, one or other of the three wheels, *m*, *n*, and *p*, and its pinion on the shaft H, and the worm *q*, and worm-wheel *l*. When a fast forward feed of the drill-spindle is required, the key *y* is so adjusted as to secure the wheel *m* to the shaft G, when the other wheels are free to revolve on the said shaft; when a slower speed is required, the wheel *n* is secured to the shaft G by the said pin *y;* and when a still slower speed is required, the smallest wheel *p* is secured to the shaft, all these changes being readily accomplished by the manipulation of the rod I. When a cessation of the feed is required, the rod M is simply pushed inward, thereby moving the clutch block N out of gear with the drill, when the drill-rod can be moved rapidly back by operating the handle or hand-wheel P. Instead of attaching the casing D and horizontal drill to the table-supporting bracket, as before described, it will be found advantageous in many cases to secure the work to the bracket, and support the casing upon a short column projecting upward from the bed-plate, as indicated by the dotted lines *z* in Fig. 1. The universality of adjustment of the several parts will not be effected by this arrangement, as the work, instead of the drill, can be raised and lowered to any extent desired, while the said drill and casing can be turned to any angle upon the supporting column *z*.

We claim as our invention—

1. The combination, with the vertical drill-spindle of a drilling-machine, of a casing arranged to carry a horizontal drill-spindle which derives its motion from the said vertical spindle, all substantially in the manner described.

2. The combination of the above with the adjustable table-supporting bracket of the drilling-machine.

In testimony whereof we have hereunto set our hands in the presence of two subscribing witnesses.

ANTHONY VAN HAAGEN.
CLAUS VAN HAAGEN.

Witnesses:
WM. A. STEEL,
THOS. MCILVAIN.