(No. Model.) 2 Sheets—Sheet 1.

T. W. GRAHAM.

CORRUGATING MACHINE.

No. 570,729. Patented Nov. 3, 1896.

Fig. 1

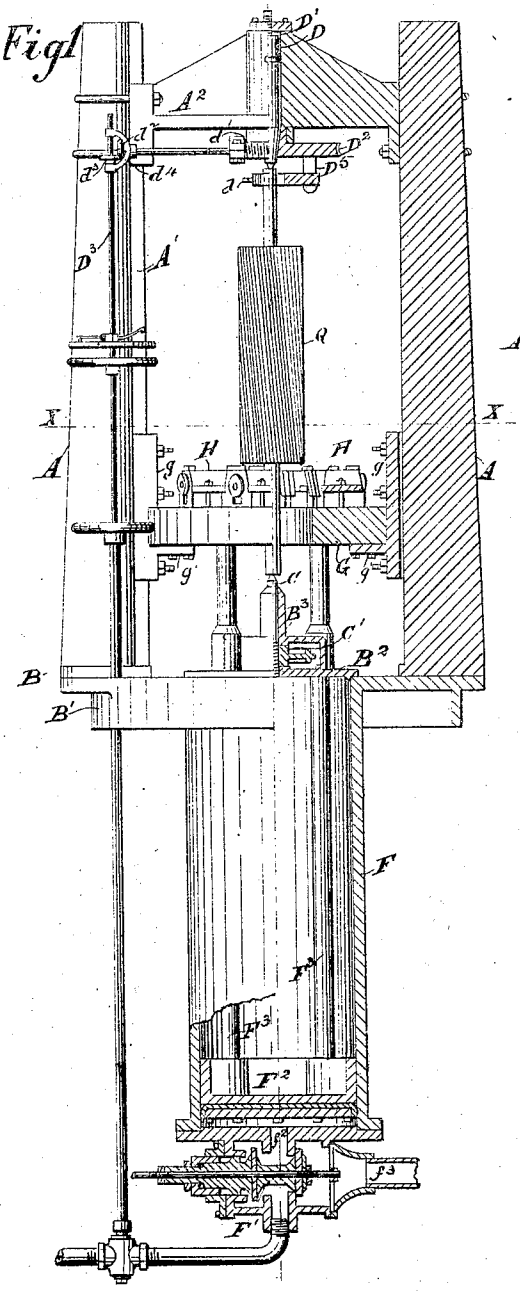


Fig. 2

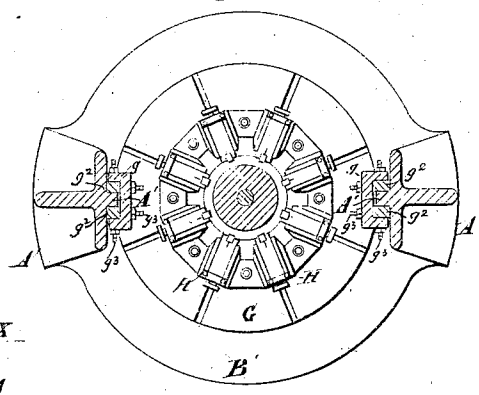
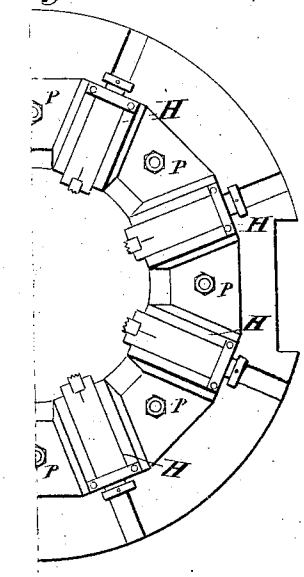


Fig. 3



Witnesses
G. A. Pennington
Geo. H. Evans

Inventor
Thomas W. Graham
By his Attorney R. S. Bacon

(No Model.) 2 Sheets—Sheet 2.

T. W. GRAHAM.

CORRUGATING MACHINE.

No. 570,729. Patented Nov. 3, 1896.

Fig. 5.

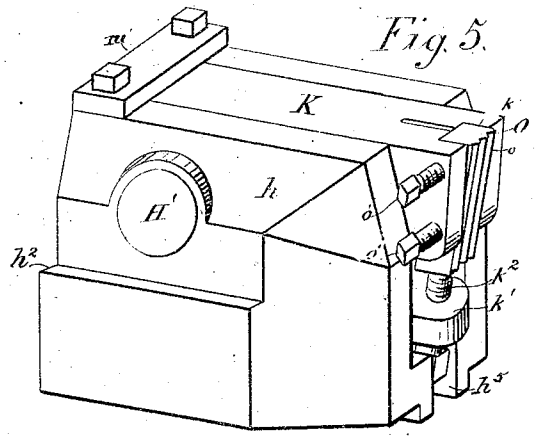


Fig. 6.

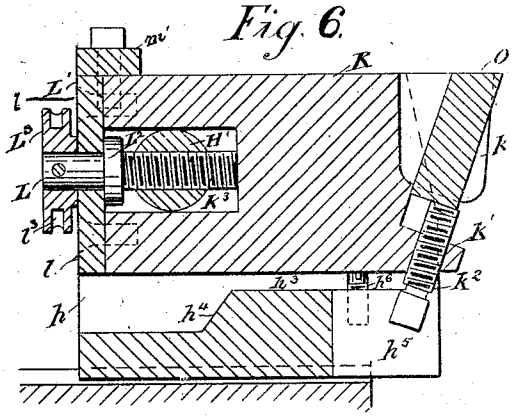
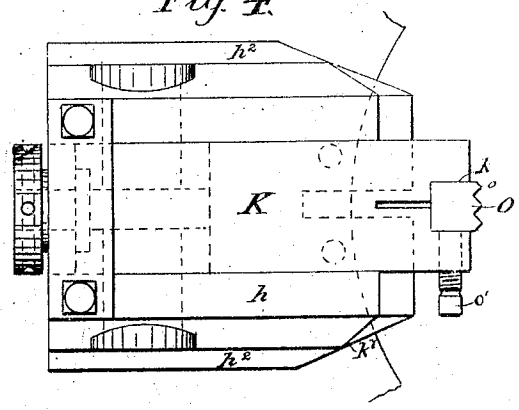


Fig. 4.



Witnesses
G. A. Pennington
Geo. H. Evans

Inventor
Thomas W. Graham
By his Attorney L. S. Bacon

UNITED STATES PATENT OFFICE.

THOMAS WILLIAM GRAHAM, OF DUBUQUE, IOWA.

CORRUGATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 570,729, dated November 3, 1896.

Application filed May 14, 1895. Renewed September 10, 1896. Serial No. 605,445. (No model.)

To all whom it may concern:

Be it known that I, THOMAS WILLIAM GRAHAM, a citizen of the United States, residing at Dubuque, in the county of Dubuque and State of Iowa, have invented certain new and useful Improvements in Corrugating-Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improvement in corrugating or grooving machines; and it consists in the construction and arrangement of parts hereinafter described, and definitely pointed out in the claims.

The aim and purpose of the invention is the provision of improved means for corrugating or grooving rolls, more especially that class of rolls used for milling purposes, and the object primarily is to so arrange and construct the machine that the grooves are cut by the movement of suitable dies rather than the movement of the roll.

The invention is illustrated in the accompanying drawings, wherein like letters of reference designate corresponding parts in the several views, and in which—

Figure 1 is an elevation, partly in vertical section, of the improvement. Fig. 2 is a cross-section on the line x x, Fig. 1. Fig. 3 is a plan view of a cluster of tool-holders. Fig. 4 is a detail plan of a tool-holder. Fig. 5 is a detail perspective view of a tool, and Fig. 6 is a detail longitudinal section through the holder and tool.

In the drawings, A designates the vertical standards, each formed on their inner faces with the guide-flanges A'. These standards are supported on a suitable base B, which in turn may be carried by a suitable superstructure. Centrally on the base is the guide-plate B^2, apertured at its center and carrying the bearing-block B^3 for the lower centering-pin C. The pin C passes through the aperture and is screw-threaded, the vertical adjustment thereof being effected by the nut C', located in the base of the bearing B^3, the nut being held against vertical movement by the housing therefor.

On the upper ends of the standards is secured the upper centering-pin D, the same being mounted in a bearing D', carried by the cross-piece A^2, which connects the standards, the connection between the ends of the cross-piece and standards being made by U-bolts spanning the standards and passing through the ends of the cross-piece. The ends of the cross-piece closely fit the guide-flanges of the standards and by the bolts are held in frictional contact, so that the cross-piece and the centering-pin may be vertically adjusted should occasion demand. The special form of connection and cross-piece is not essential, as any desired form and connection can be employed.

On the under face of the cross-piece is loosely mounted the worm-gear D^2, carrying an angle-arm rigidly secured on its under side. This arm is arranged to encircle the roller-shaft and by the set-screw d be clamped thereto, whereby the rotation of the gear will rotate the roll.

The means by which the gear is driven and also held in its adjusted position comprises the worm d', mounted in suitable bearings on the cross-piece and having a miter-gear d^2 at its outer end, with which a miter-gear d^3 on the vertical-actuating-shaft D^3 meshes, the latter being provided with suitable means for actuating the same. The outer end of the worm-shaft and upper end of the shaft D^3 are journaled in the yoke-bearing d^4 on one of the standards.

Centrally between the plane of the standards and located below the base is the hydraulic cylinder F, connected to and supported by the base. The cylinder is provided with a suitable inlet-port f^2, adapted to be connected with a water supply, and has the discharge-port f^3 leading to any suitable point.

F' designates the controlling-valve for the ports. Within the cylinder is placed the piston F^2, from which extend the vertical posts F^3, the same passing through apertures in the head or guide plate B^2 and upward to a point above the plane of the centering-pin C.

On the upper ends of the posts F^3 is mounted the ring-shaped carriage G, which has a central bore greater in diameter than the roll Q. This carriage has secured at diametrically opposite points the guide-blocks g, preferably by forming flanges g' on the lower end

of the blocks and securing the flanges to the carriage by suitable bolts. The blocks g are formed with channels in their outer faces into which the guide-flanges of the standards pass. To form a close contact between the flanges and blocks, suitable packing-blocks g^2 are interposed, the same being carried by the blocks g and adjusted in or out by the bolts g^3. By this means all vibrations or irregular movements of the carriage are prevented.

On the upper face of the carriage are secured the tool-holders H, arranged radially at different points and equidistant apart. These holders consist, primarily, of two members, the stationary or base member h and the adjustable holding member K. The base members h are formed with flat under faces resting on the carriage, their outer vertical sides being formed with shoulders h^2. The centers of the members h are formed with longitudinal channels h^3, which are deepened at their outer ends at h^4, and at their forward ends terminate in the slots h^5, leading through the base. In the lower wall of the channels, at a point near the forward end, are placed the adjusting-screws h^6, entering sockets in the wall.

H′ designates a transverse cylindrical shaft spanning the channel and loosely journaled in the side walls thereof at a point adjacent to the outer ends of the member.

The tool-carrier or movable member K consists of a solid block having an inclined recess k in its inner end, open at its top and terminating at a point near the base of the block, thus forming a lip k', through which the inclined adjusting-screw k^2 passes into the slot, and projects into the slot of the base member. The rear end of the block K is recessed transversely, as at k^3, and receives the shaft H′. This recess opens to the end of the block.

To adjust the block K longitudinally, the screw L is employed, which passes through a threaded aperture in the shaft H′.

L′ is a backing-plate removably secured by screws l to the outer end of the block covering the open end of the recess. Through this plate passes the outer end of the screw L, a suitable collar L^2 being secured on the screw and abutting against the inner face of the plate. The outer end of the screw L has a turning disk L^3 thereon, which is preferably formed with cavities l^3 for the reception of the turning key or pin. (Not shown.)

To limit the upward movement of the outer end of the block K, a cross-bar m' is bolted on the rear upper edges of the base h, spanning the space between, and against which the block rests.

An important feature of the invention is the cutting-tool O, which is rectangular and formed with a working face having a series of vertically-arranged teeth or ridges o extending from end to end. The upper end of the tool is beveled or inclined, and when the tool is adjusted in its groove or inclined recess k the top of the tool will be flush with the top of the block K. To properly adjust the cutting-tool, binding-screws o' are passed through the side walls of the recess k, which impinge against the sides of the tool and hold it in position. The base of the tool rests against the adjusting-screw k^2.

To center the tools, the lower members of the holders are properly arranged and the triangular plates P are placed between, resting on the flanges or shoulders h^2, and suitable bolts are passed through the plates into the carriage.

In operation the roll Q is adjusted by centering the centering-pins C D in the arbor thereof and clamping the arm D^5 to the arbor. The roll is thus held firmly against vertical as well as rotary movement. The water is then turned into the cylinder, forcing the piston up, which in turn forces the tool-carriage upward, the tool having been previously adjusted to cut the grooves in the periphery of the roll as the upward movement of the carriage is continued. As soon as the full stroke of the piston is reached the valve for the cylinder is by any suitable means adjusted, allowing the water to escape and the carriage to descend by its own weight as the water recedes. In descending the tool-carrying blocks swing up on the pivot-shafts H′ and thereby offer no resistance to the downward movement of the carriage. As soon as the carriage has reached its lowermost position the roll is given the proper turn through the instrumentality of the worm-gear and the operation repeated. Should a tool become broken or dulled at its cutting-point, it is only necessary to grind off the upper beveled end, and this can be repeated until the tool is practically destroyed. By this means the tools can be quickly sharpened with but slight trouble and expense. The adjusting-screws on top of which the tool rests can be adjusted when the holder is in position by inserting the proper tool in the slots h^5 of the stationary member h, which latter normally projects beyond the inner wall of the carriage, as shown in Fig. 5. The purpose of the adjusting-screws h^6 is to secure the proper adjustment of the inner ends of the blocks K.

By arranging the tools in a circle around the roll every upward movement of the carriage cuts not less than eight grooves or corrugations in the roll to the proper depth. The depth of the corrugations may be easily varied by adjusting the screws L to carry the tools in or out, as the case may be.

I am aware that the means for vertically moving the carriage may be varied, and do not wish my invention understood as being limited to the particular hydraulic means shown and described.

I am also aware that many other changes in the various forms and arrangements of the parts of the machine can be made and substituted for those herein shown and described

without in the least departing from the nature and principle of my invention.

Having thus fully described my invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. In a corrugating-machine, the combination with means for supporting and holding the roll in a fixed position, of a vertically-reciprocating carriage through which the roll passes, a circular series of horizontally-pivoted tool-holders mounted on the upper face of the carriage, means for adjusting the holders radially, and means for forcibly moving the carriage upward across the surface of the roll, substantially as described.

2. In a corrugating-machine, the combination with means for fixedly supporting the roll and means for holding the roll in position, of a carriage having a central bore greater than the diameter of the roll, means for forcibly moving the carriage upward across the face of the roll, guides for the carriage throughout its entire movement, a radially-arranged series of horizontally-pivoted tool-holders mounted on the upper face of the carriage, tools in the holders, and means for radially adjusting the holders, substantially as described.

3. In a corrugating-machine, the combination with vertical standards and roll-supporting means at opposite ends and between the same, of a ring-shaped carriage between the standards, guide-blocks on the carriage engaging the standards, a hydraulic cylinder below the standards, a piston in the cylinder, posts on the piston supporting the carriage at their upper ends, and a circular series of horizontally-pivoted tool-holders on the upper face of the carriage having tools projecting into the open center of the carriage, substantially as described.

4. In a corrugating-machine, the combination with roll supporting and holding means, of a ring-shaped carriage through which the roll passes, means for guiding the carriage, means for forcibly moving the carriage in one direction, and a circular series of horizontally-pivoted tools pivotally supported to have a vertical movement on the carriage projecting into the opening of the center thereof, substantially as described.

5. In a corrugating-machine, the combination with a plurality of vertical standards, a fixed base, a centering-pin in the base, a cross-bar at the top of the standards, a centering-pin carried thereby, a roll-adjuster, a ring-shaped carriage between the standards, guides between the carriage and standards, means for forcibly moving the carriage vertically upward, and a series of tool-holders pivoted to swing in a vertical plane mounted on the carriage and having tools projecting radially inward beyond the same, substantially as described.

6. In a corrugating-machine, the combination with a plurality of vertical standards, a fixed base, a centering-pin in the base, a cross-bar at the top of the standards, a centering-pin carried thereby, a roll-adjuster, a ring-shaped carriage between the standards, guides between the carriage and standards, adjustable packing between the guides and standards, carried by the guides, means for forcibly moving the carriage vertically, and a series of tool-holders on the carriage having tools projecting radially inward beyond the same, substantially as described.

7. In a corrugating-machine, the combination with a reciprocating carriage, of a tool-holder thereon comprising a fixed member and an adjustable member, means for longitudinally adjusting the adjustable member, means for vertically adjusting the inner end thereof, and adjustable tools carried by the movable member, substantially as described.

8. In a corrugating-machine, the combination with a tool-carrier, of a tool-holder comprising a stationary member having an open center and a transverse shaft spanning the opening, and a movable member pivoted on the shaft and formed with a recess in its outer end and an inclined recess at its inner end, a removable tool in the inclined recess, means for securing the tool in position, and means for longitudinally adjusting the movable member, substantially as described.

9. In a corrugating-machine, the combination with a tool-carrier, of a tool-holder thereon comprising a stationary member having a channel therein and a slotted inner end, and a movable member loosely fitted in the channel having an inclined recess at its inner end open at its upper end and closed at its lower end, a set-screw passing through the lower wall of the recess into the slot of the stationary member, a tool clamped in the recess, and resting on the screw, and means for longitudinally adjusting the movable member, substantially as described.

10. In a tool-holder for corrugating-machines, a stationary member and a vertically-movable member pivoted thereto, and means for longitudinally adjusting the movable member on the stationary member engaging the pivot, substantially as described.

11. In a corrugating-machine, a tool-holder comprising a stationary member and a movable member located within the stationary member and formed with a recess in its outer end, a horizontal shaft on the stationary member passing through the recess, a screw in the movable member held from independent longitudinal movement therewith and engaging the shaft, and a tool in the opposite end of the movable member, substantially as described.

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

THOMAS WILLIAM GRAHAM.

Witnesses:

H. C. KENLINE,

J. C. LONGUEVILLE.