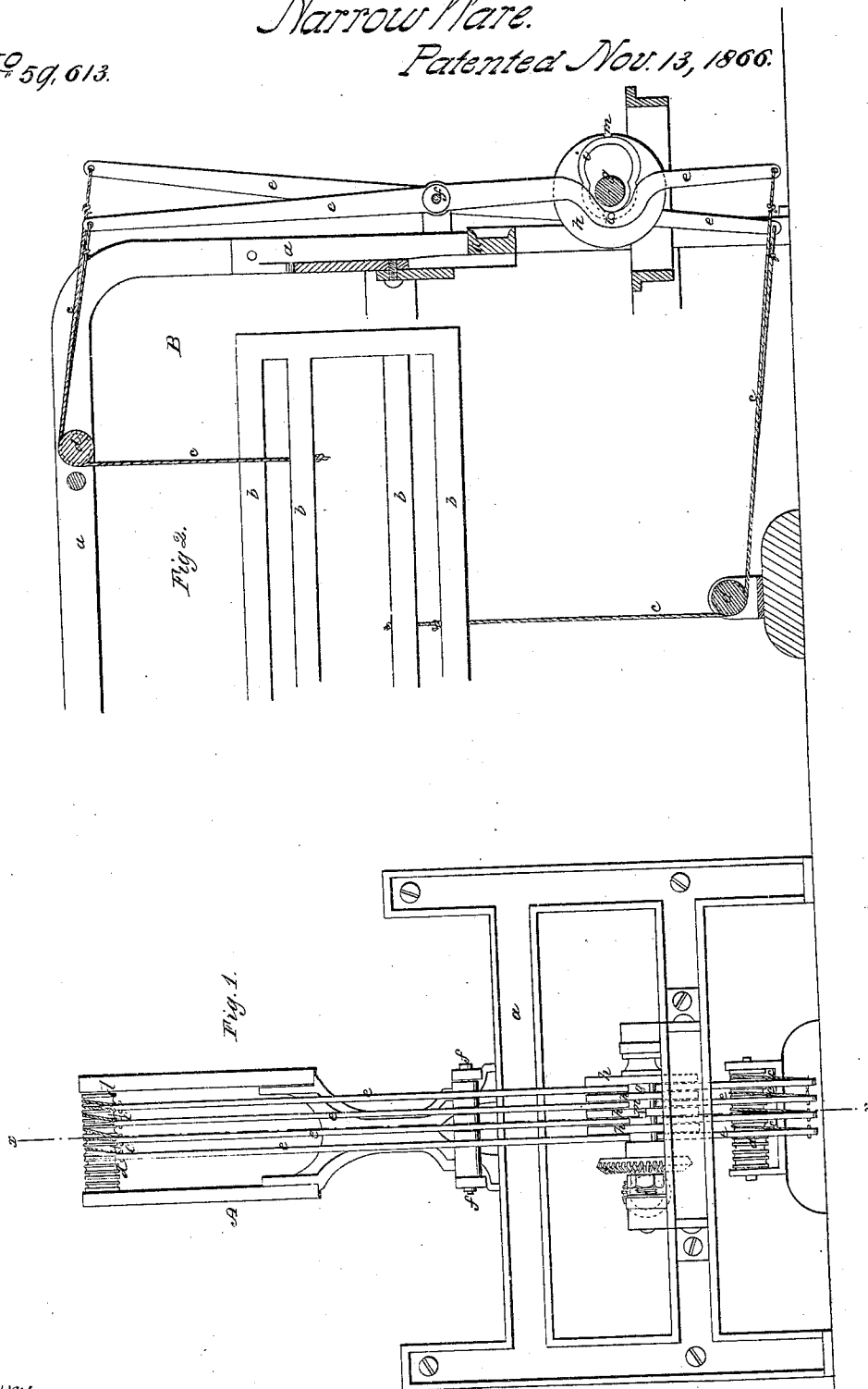


L. J. Knowles.  
Narrow Ware.

No. 59,613.

Patented Nov. 13, 1866.



Witnesses.

J. B. Kilders  
W. W. Spittinghand.

Inventor.  
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by his attys, Crockett & Gould.

# UNITED STATES PATENT OFFICE.

LUCIUS J. KNOWLES, OF WARREN, MASSACHUSETTS.

## IMPROVEMENT IN NARROW-WARE LOOMS.

Specification forming part of Letters Patent No. 59,613, dated November 13, 1866.

*To all whom it may concern:*

Be it known that I, LUCIUS J. KNOWLES, of Warren, in the county of Worcester and State of Massachusetts, have invented an Improvement in Narrow-Ware Looms; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

The invention relates to the harness-motion of narrow-ware looms, and particularly to the arrangement of the heddle-lever cams with respect to the heddle-levers which operate the harness-frames to produce the shed.

The object of the invention is to so construct or arrange the cams and the lever-pins upon which they operate that they are not only compacted in position, but present no angles or salient points to catch dirt or fibrous matter or the clothes of operatives.

The invention consists in operating the heddle-levers by path-cams cut in the faces of rotary disks, the levers extending through between the adjacent disks, so that the cams and the lever-pins projecting into them are virtually contained within and boxed up by the disks.

The drawings represent a loom-frame and harness, A showing an end elevation thereof, and B a section on the line  $x x$ .

$a$  denotes the frame of the loom;  $b b$ , the heddles, operated by cords  $c c$ , fastened at one end to the harness-frames, and passing over sheaves  $d d$  to the upper and lower ends, respectively, of the heddle-levers  $e e$ , as seen at B, these levers being hung upon a fulcrum-shaft,  $f$ , and operating the heddles to form the shed in the usual manner.

$g$  denotes the shaft from which the heddle-levers are operated, this shaft being connected with and driven by the driving-shaft through intermediate gearing. The shaft  $g$  carries a series of circular disks,  $h$ , fixed upon and revolving with it. Each of these disks is of a thickness corresponding to the space between the adjacent heddle-levers, and the adjacent disks are placed at a distance apart equal to or but slightly greater than the thickness of the levers, and so as to permit one of the levers to pass down between them and vibrate upon the fulcrum-shaft  $f$ .

In one face of each disk is a path-cam,  $i$ , as seen at B, into which a pin,  $l$ , projects from the adjacent heddle-lever, the cams in the several disks being so arranged with respect to each other as that their action upon the levers shall successively raise and depress the harness-leaves to form the shed in the usual and well-known manner, and in conformity to the work to be produced upon the loom. A slot,  $m$ , opens from each cam to the periphery of the disk, so that as the pin comes opposite to the slot any lever may be swung out of connection with its cam to leave any particular heddle or heddles at rest, as may be desirable.

I claim—

The arrangement of the heddle-operating cams in circular disks between which the levers extend, when the levers and pins, disks, cams, and cam-slots have a relative disposition, substantially as described.

LUCIUS J. KNOWLES.

Witnesses:

J. B. CROSBY,  
FRANCIS GOULD.