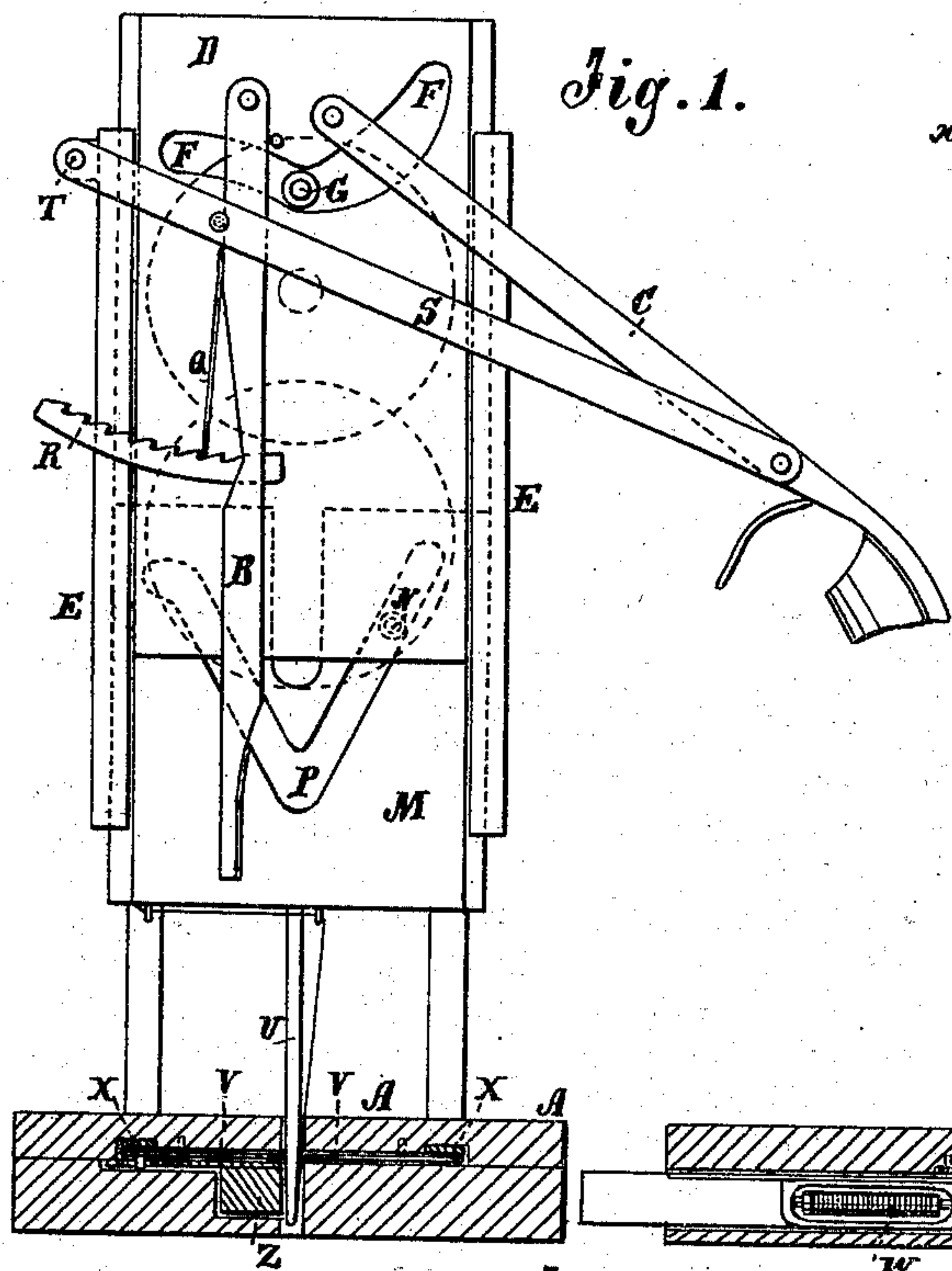


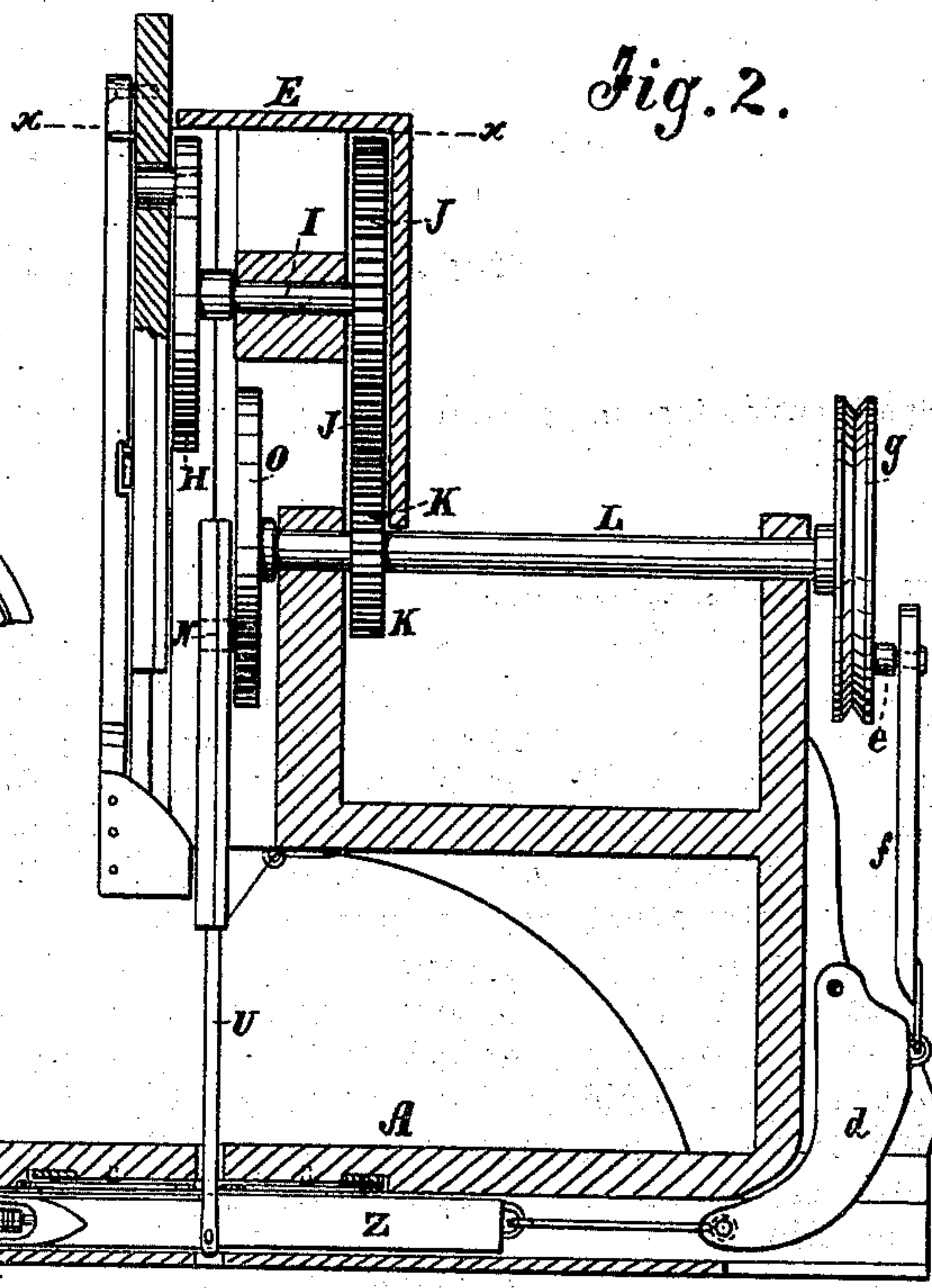
**J. McNEAL.**  
**Grain-Binders.**

No. 156,301.

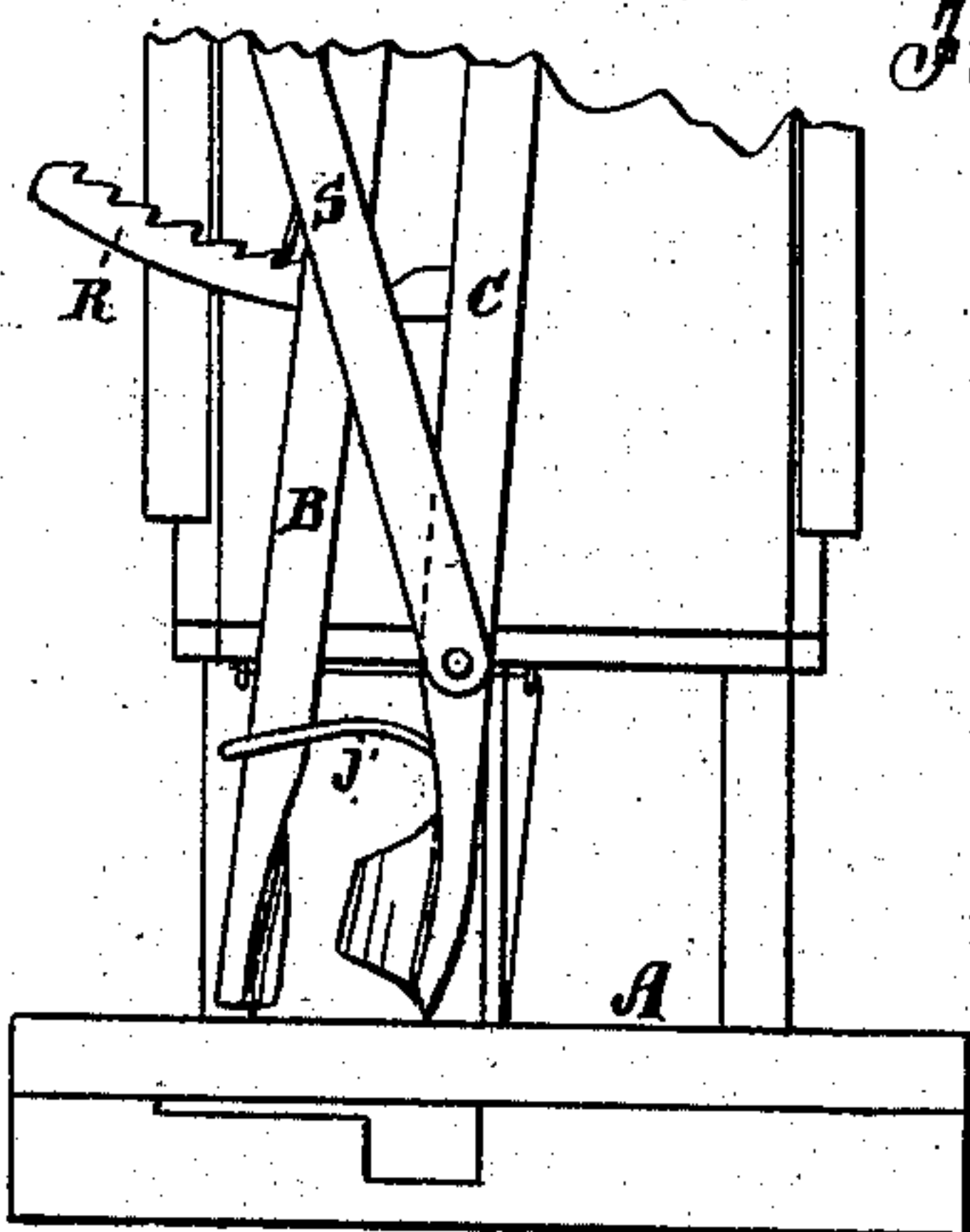
Patented Oct. 27, 1874.



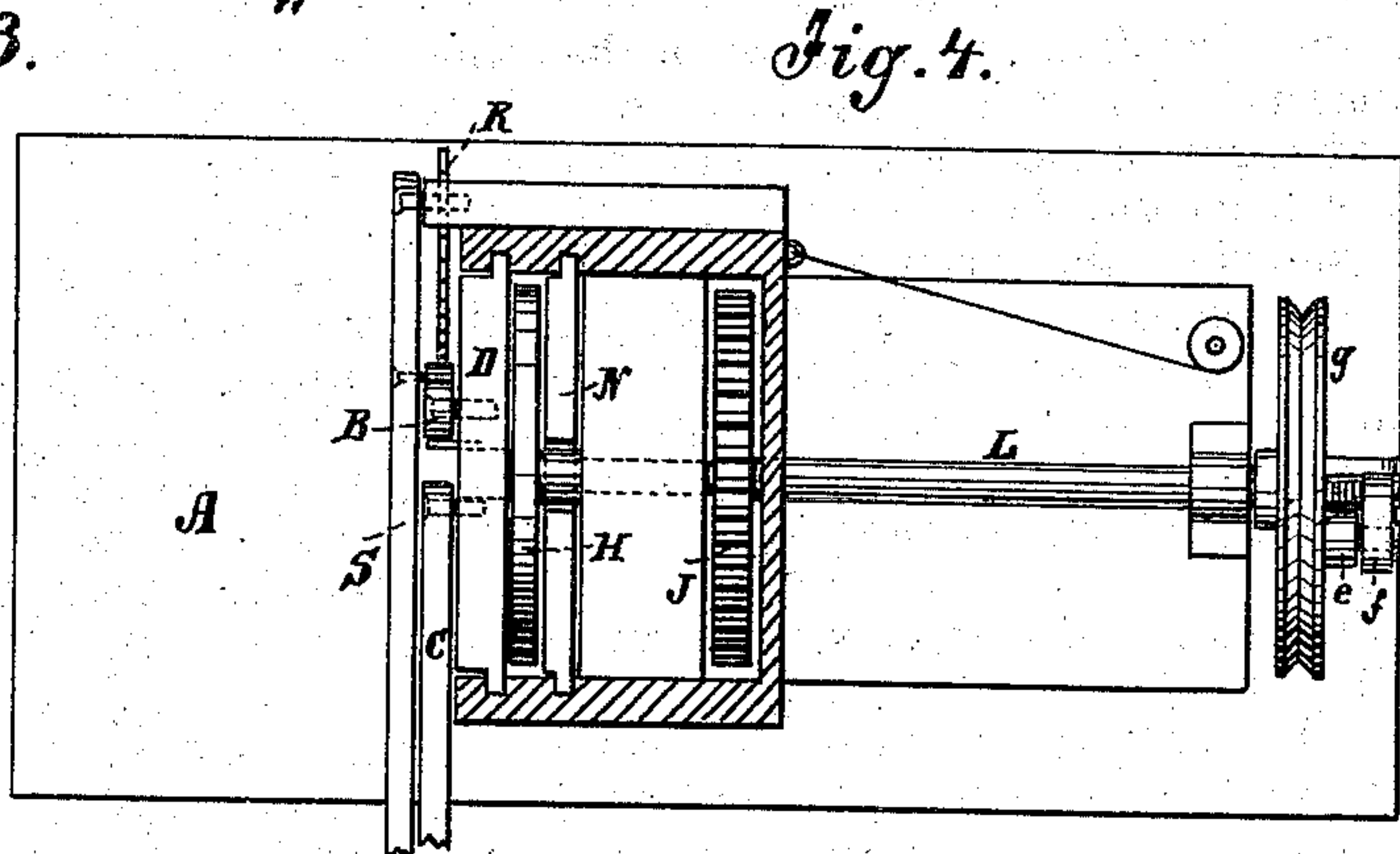
*Fig. 1.*



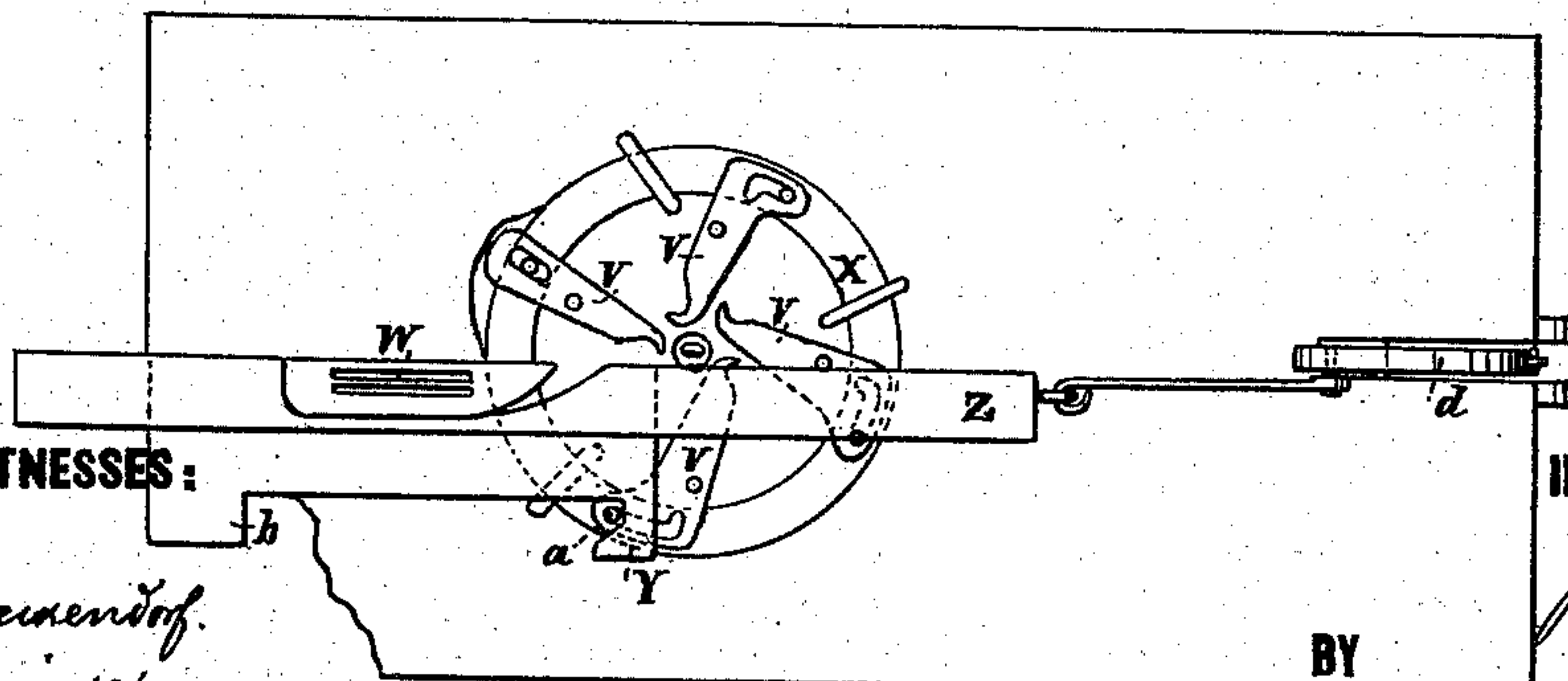
*Fig. 2.*



*Fig. 3.*



*Fig. 4.*



*Fig. 5.*

WITNESSES:

*A. Benneken & Co.*  
*Edgwick*

INVENTOR:

*J. McNeal*  
*Mumt Co.*

ATTORNEYS.



# UNITED STATES PATENT OFFICE.

JAMES MCNEAL, OF CHAUNCEY, ILLINOIS.

## IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **156,301**, dated October 27, 1874; application filed June 13, 1874.

*To all whom it may concern:*

Be it known that I, JAMES MCNEAL, of Chauncey, in the county of Lawrence and State of Illinois, have invented a new and Improved Grain-Binder, of which the following is a specification:

My invention consists of a pair of griping-arms, in combination with a sewing-machine needle and shuttle and looping-hooks, so contrived that they gripe the gavel, compress it, and pass it across the needle-hole into a bight of the twine, and hold it while the twine is being tied by the sewing-machine devices, all in a manner calculated to make a simple but efficient machine.

Figure 1 is a front elevation of the upper part of the machine, and a section of the table or platform. Fig. 2 is a sectional elevation taken at right angles to the plane of Fig. 1. Fig. 3 is a partial front elevation of the machine, showing the position of the gripers while holding the gavel for the tying of the band. Fig. 4 is a horizontal section taken on the line *xx* of Fig. 2. Fig. 5 is a plan of the under side of the plate or table, showing the arrangement of the looping-hooks and the shuttle.

Similar letters of reference indicate corresponding parts.

A is the platform or table, on which the gavel is received from the reaping-machine to be bound. B and C are griping arms or jaws, for compressing the gavel, carrying it across the line of the needle, against the twine, and into a bight of it, and holding the gavel while the band is being tied. These arms are pivoted at the upper end to a vertically-moving plate, D, arranged in guideways in a head, E, and connected, by an angular slot, F, with a crank-pin, G, of a disk, H, on a short shaft, I, in the upper part of the head, which is geared by the wheel J and pinion K with the crank-shaft L, which drives another vertically-reciprocating plate, M, by a crank-pin, N, in its disk O, which connects with said slide by a V-shaped slot, P, in it. The griping-arm B is held stationary to receive the gavel against it; but it is adjustable toward and from the needle, to adapt it for large or small bundles; and it is held in position by a spring-pawl, Q, and rack R. The arm C is connected, near its

lower end, to a bar, S, which is pivoted to the head at T, so that when the plate D rises it will swing the arm upward, to allow the gavel to be delivered under it onto the table, where the arm will catch it when the plate moves down, and push it under the needle and against the arm B.

After the gavel is thus received and secured in the griping-arms, the needle U goes down with the twine, and the hooks V catch the loop and hold it open in a kind of horizontal loop, that is accomplished by means of the stud attached to the ring X and different-sized cam-slots in the extensions of the hook. As the ring is forced around, the hook with the smallest transverse play in the slot seizes the twine and delivers it to the next succeeding hook, which latter, as it is operated upon by its stud in the slot, receives the same and passes it to the next, until a perfect horizontal loop is formed. After the loop is thus formed the needle descends a second time and passes through the said loop, and the shuttle W goes between the needle and the thread below the first loop held on the hooks, and locks the needle-thread; then the hooks throw off their loop, and the needle-thread draws up and forms a knot above the plate. The griping-arms then let go, and allow the sheaf to expand in the band against the knot, and make the band tight. Then, while the next gavel is gathering, another knot is tied to connect the twine, and the twine is cut between the two knots, for freeing the sheaf to be discharged either by hand or any convenient mechanism. The needle-shaft makes two motions to one of the griping-arms by means of the gears, and the needle makes two movements to one of the shaft by means of the slot P, in order to deliver the thread to the hooks, and then go through the loop held open by them, while the gripers hold the gavel.

The hooks are attached to a ring or wheel, X, arranged in a recess in the under side of the table above the shuttle, and they are turned to catch the loop and spread it out by the catch *y* on the shuttle-working bar Z, which strikes the stud-pin *a* on the wheel just before the bar comes to rest, when the shuttle is moved back to the left; (see Fig. 5;) and they are moved back again, ready for the next op-



eration when the shuttle goes to the other end of its movement, by the catch *b* coming against the same stud.

The needle also makes two movements to one of the shuttle by the *V* slot, so that the hooks take the twine at one movement, and the shuttle takes it at the next.

The shuttle-driver is worked by the swing-lever *d*, which is connected to the crank *e* on the driving-pulley *g* by the connecting-rod *f*; but a vertical shaft, gearing with the driving-shaft, and having a crank on the lower end, connected with the shuttle-driver, may be used, if preferred.

When the shuttle goes through the loop below the hooks, the hooks move together a little by the tension of the twine, and thus lessen the friction of the loop on the shuttle, the hook being at that time free from the catch which swings them out.

The knot tied by the machine is of the kind known as a weaver's knot.

The griping-arms may be used with other sewing-machine devices for tying the knot, if preferred.

The rod *j* prevents the gavel from being forced up between the arms.

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

1. In a grain-binder, the combination of griping-arms *B* and *C*, the former held vertical, or nearly so, and both pivoted to a vertically-reciprocating plate, *D*, and the bar *S*, pivoted to a fixed support, substantially as shown and described.

2. The combination of griping-arms *B* and *C*, connecting-bar *S*, sliding plate *D*, needle *U*, hooks *V* and *y*, ring *X*, and the shuttle, as shown and described, to operate as specified.

3. The arms *B* and *C*, spring-pawl *O*, and toothed bar *R*, combined and arranged substantially as specified.

4. The combination of hooks *V*, needle *U*, ring or wheel *X*, shuttle *W*, and shuttle-driver *Z*, as shown and described.

5. The combination of needle *U*, disk *O*, shaft *L*, pulley *g*, rod *f*, lever *d*, shuttle and shuttle-driver, pivoted hooks *V*, ring *X*, hook *y*, as shown and described.

JAMES MCNEAL.

Witnesses:

H. P. SMITH,  
J. D. GREEN.