

J. F. APPLEBY.

TENSION DEVICE FOR GRAIN BINDERS.

No. 252,988.

Patented Jan. 31, 1882.

Fig. 1.

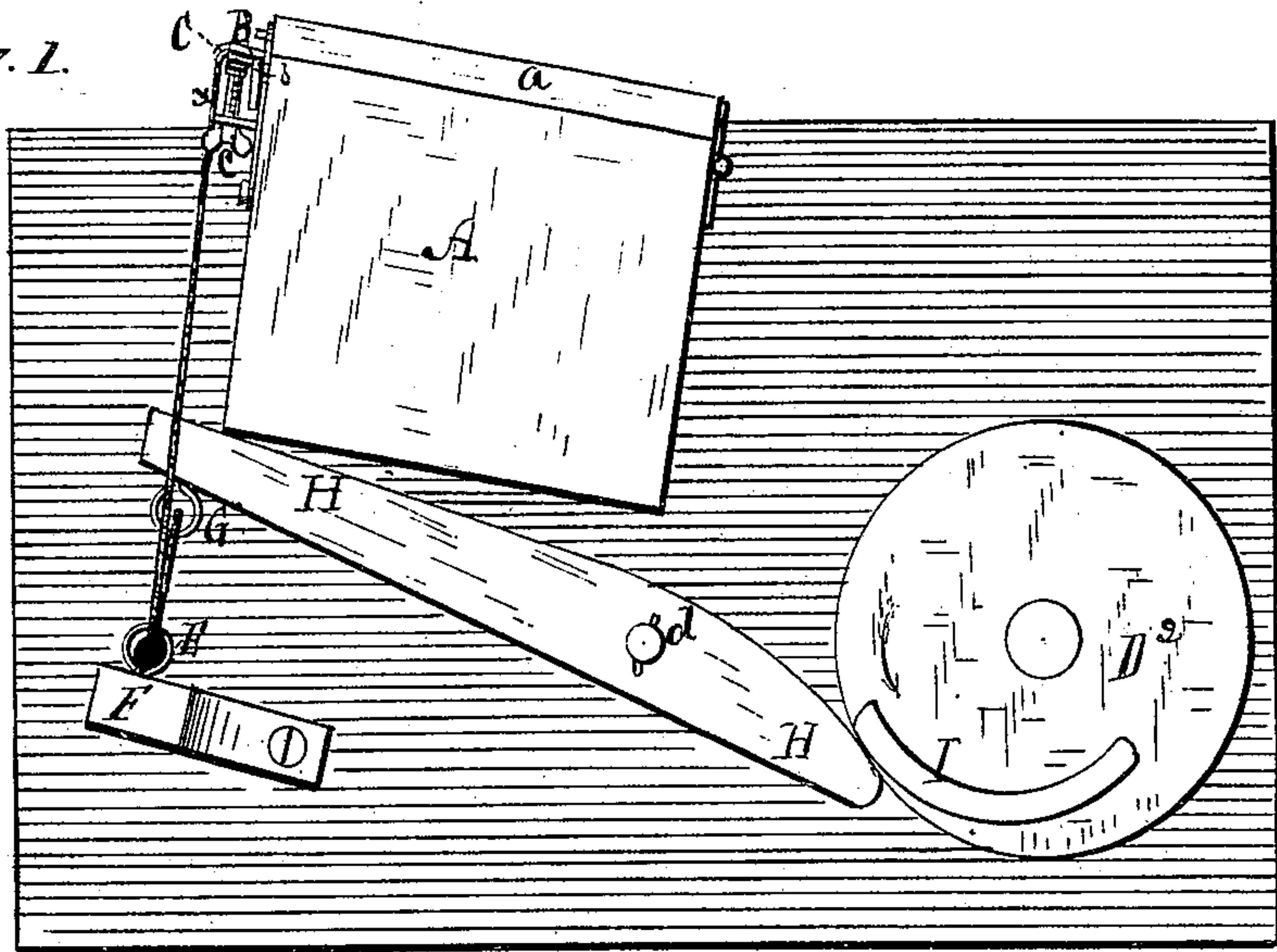


Fig. 2.

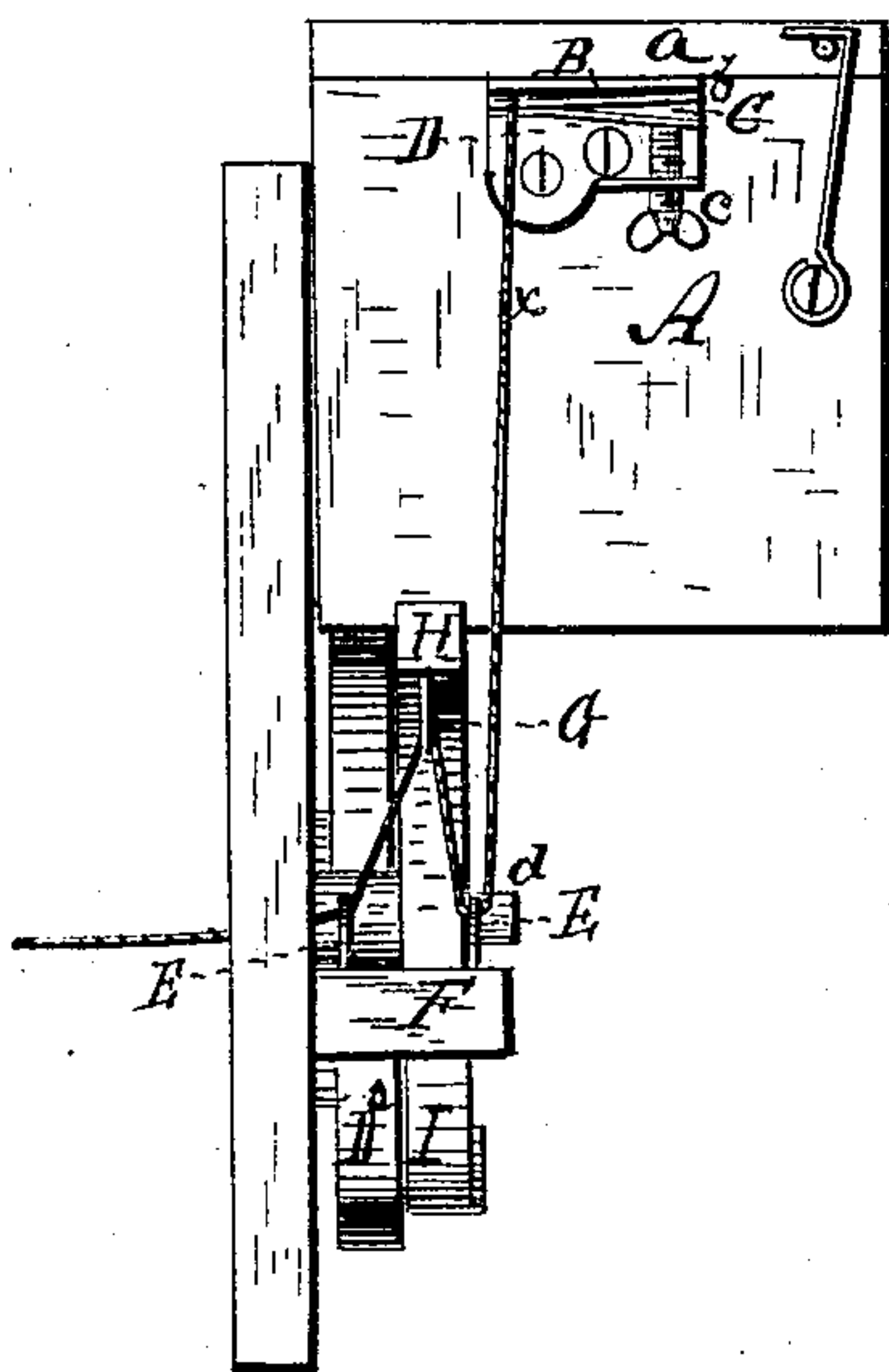
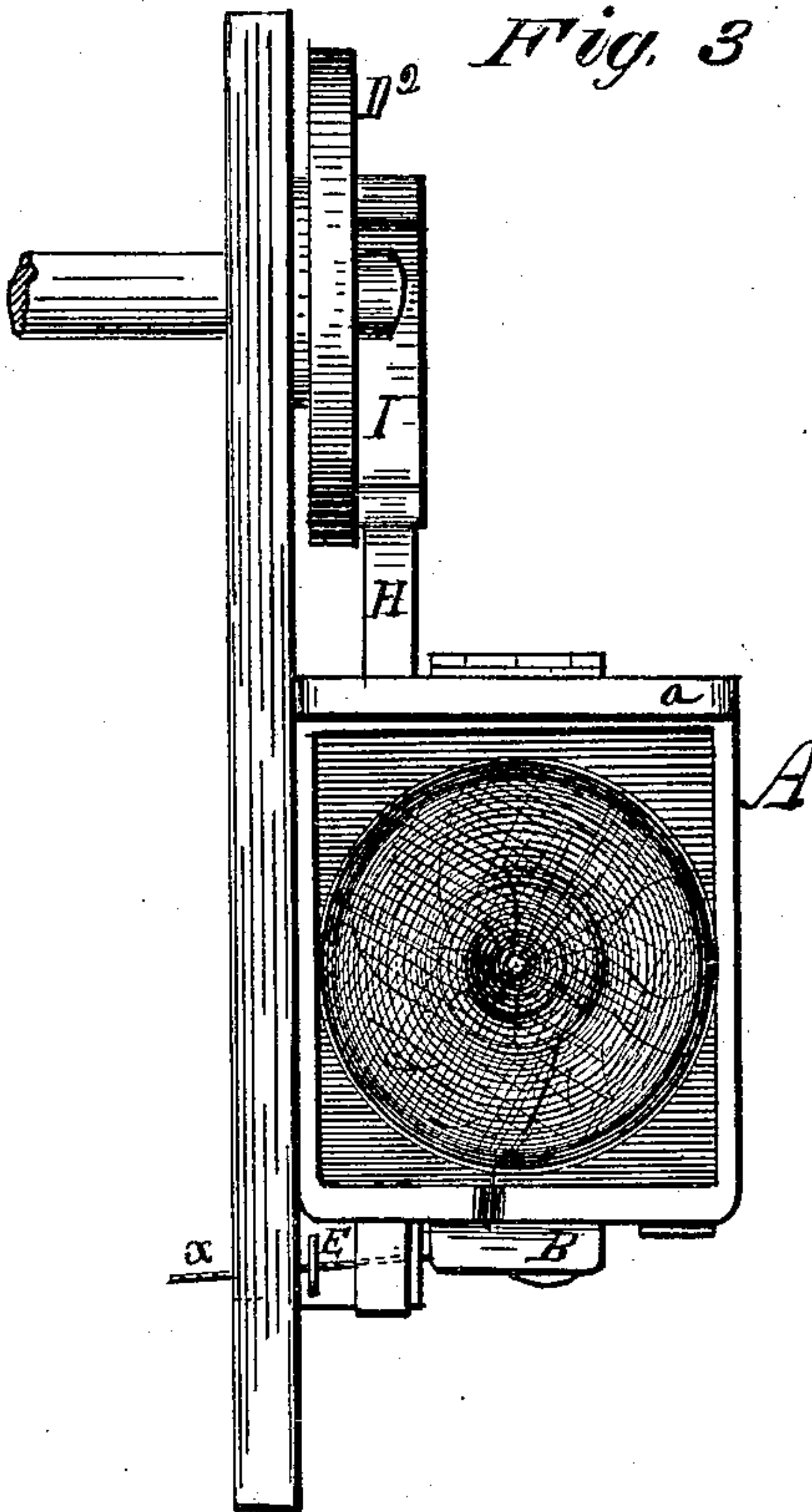


Fig. 3.



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# UNITED STATES PATENT OFFICE.

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## TENSION DEVICE FOR GRAIN-BINDERS.

SPECIFICATION forming part of Letters Patent No. 252,988, dated January 31, 1882.

Application filed December 9, 1879.

*To all whom it may concern:*

Be it known that I, JOHN F. APPLEBY, of Beloit, in the county of Rock and State of Wisconsin, have invented certain new and useful Improvements in String Tension Devices for Self-Binding Harvesters; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, forming part of this specification, and to the letters of reference marked thereon.

Figure 1 is a side view of so much of a machine to which my invention is designed to be applied as is necessary for the purpose of illustrating said invention. Fig. 2 is a front view of the same. Fig. 3 is a top view of the same.

In the several figures the same part will be found designated by the same letter of reference.

In automatic or self binder harvesters it is usually desirable and important to have the cord or string subjected to different degrees of tension during different stages or steps of the operations performed by the binding mechanism, and in some forms of machines of this species it is essentially necessary that the cord be acted upon with a variable tension during the binding operations. In such a self-binder, for instance, as that patented to me February 18, 1879, No. 212,420, in which the binder mechanism is set in operation by the action of a trip-lever actuated by the pressure of the gavel, it is quite necessary that the cord should be paid out very freely during the packing of the grain (which it partially surrounds) in the gavel-receptacle, and then be restrained more or subjected to greater tension during the compressing action of the needle-arm, then be again let out freely to facilitate the knot-tying operation, and then again be let out still more freely to create the loop into which the grain is to pass at the beginning of the collection of the grain for the formation of another gavel, and so on. It is also desirable to have the tension devices such that, in addition to the variations mentioned above, the tension may be set at any degree, without changing said conditions, at the will of the operator and as circumstances may require, and such that its operations shall not be either destroyed or hindered by the presence of any knots or sudden bulges in the cord that has to pass through said tension devices.

To provide for self-binder harvesters simple and efficient means by which the paying out of the cord may be regulated in the manner alluded to and without danger of any hitch or clogging is the object of my invention, which to this end consists, first, in the employment of a tension device which may be adjusted or set to act continuously with any given degree of tension, and which is adapted, as will be hereinafter explained, to automatically yield or release its hold on the cord to permit the passage of any knot or enlargement of the cord; second, in the employment, in combination with some suitable means for regulating the paying out of the cord from the ball or spool, of means capable of applying to the cord a varying tension, according to the requirements of the mechanism by which the cord is used in the operations of forming the loop for the reception of the grain, encircling the latter with the cord, and tying the cord, all as will be hereinafter more fully explained; third, in the employment of an automatic tension device capable of applying to the cord a varying tension during the binding operations, and also adapted, as will be presently explained, to create a slack in the cord at the proper time and in the proper manner to facilitate the formation of the loop for the accommodation of the grain at the commencement of the collection of a gavel.

To enable those skilled in the art to make and use my invention, I will now proceed to describe it more particularly by reference to the drawings.

In the form of machine shown the ball of cord is contained in a simple box or receptacle, A, from which it is drawn through, first, a spring tension device, and, second, a contrivance for applying automatically an increased and diminished tension. The means for giving the first and regular tension is composed of a fixed plate, B, and a movable plate, C, between the opposing surfaces of which the string passes, the lower movable plate, C, being held up to the under surface of the upper fixed plate, B, by means of a spring, D, the pressure or strength of which may be increased or diminished by turning a set-screw, *e*, in a manner well understood. The plates B and C are by preference arranged in about a horizontal position in the machine, the lower one, C, being hinged at *b* to the upper one, B; and



below these plates at a suitable distance are located two stationary eyes, E E, through which the cord  $x$  passes, as shown, and whence it passes off to the needle-arm of the binding mechanism of the harvester.

G is a movable eye, which is arranged, as shown, on or near one end of an oscillatory lever, H, that is pivoted at  $d$  to the machine, and has its other end adapted to be operated upon by a cam, I. This cam I projects from one side of the wheel  $D^2$ , that receives a continuous and uniform rotary motion from some running part of the harvester, and the said cam and lever are arranged and operate so that the longer end of the lever is elevated by the action of the cam on its shorter arm, and descends by gravity at just the proper times and to the proper extent to cause the movable eye G to alternately take up the string  $x$  (at a point between the stationary eyes E E) and let it down again, for the purpose of increasing and diminishing the tension. In its descent the eye G in the long arm of the lever H comes to a rest on the block or stand F (or on some other suitable stop) in such a manner that when this arm is in its normal position the stationary and movable eyes E E and G will be about in line, so that the cord may be pulled through all of these eyes without any frictional tension except that caused by the action of that one of the two stationary eyes through which the cord first passes on its way from the cord-box A.

It is essential to the proper operation of the tension device composed of the plates B and C that the eye E, through which the cord  $x$  first passes after leaving said tension device, should be located so that the line of draft of the cord on the said tension device will be in a direction substantially at right angles to the plane of the said plates, or, in other words, in a direction substantially the same as that in which the movable end of the plate C must travel when pulled away from the under surface of plate B. And as to the other tension device, it is necessary that the eyes E E and G should be substantially in line when in that relative position in which the device is required to exert the least tension.

Irrespective of these essentials it is not of course important that the details of construction shown in the drawings be followed in carrying out my invention.

The operation of the contrivance is as follows:

Assuming the binder mechanism of the harvester to be in that condition of operation in which the cord-needle and compressor-arm are about completing the encirclement of the gavel with the cord, and the latter is about to be tied to form the sheaf, the movable parts of the contrivance would be in about the relative positions seen in Fig. 1. Now, as the band is tied and cut and the sheaf discharged, the short end of the lever H is relieved from the action of the cam I and its longer arm is allowed to descend, thus lowering the eye G into

line with the eyes E E, and not only greatly diminishing the tension on the cord  $x$ , but creating a sudden slack in said cord equal to the difference in length between the amount of cord necessary to reach in a straight line from E to E and that requisite to extend from E to G and thence to E when the three eyes are in the position seen at Fig. 2 of the drawings. This sudden slack in the cord facilitates the formation of a slight loop or depression in the cord between the eye of the (now receded) needle-arm and the cord-holder of the binder at the commencement of the refilling of the gavel-receptacle, and after the taking up of this slack by the pressure of the grain the continuance of said pressure then draws out the requisite cord against the tension created by the devices at B C, augmented by that created by the partial turn of the cord  $x$  round that one of the eyes E through which said cord first passes after leaving the box A. Should there happen to be a knot in the cord or a bunch which will not pass between the plates B and C when in their normal relative positions, such obstruction will produce the effect of an instantaneous and sufficient draft of the cord  $x$  directly downward on the spring-plate C, that will operate to pull said spring-plate away from the lower surface of plate B until a space shall have been created between the adjacent surfaces of C and B of sufficient capacity to permit the free passage between said plates of the knot or bunch that might otherwise either derange the tension device or cause a breakage of the cord. The instant the knot shall have passed into the space between the plates B and C it will be compressed between them, and these plates will resume their normal relative positions as the knot escapes from between them, and in such a manner that the passage of the obstruction through the tension device will not be injuriously or perceptibly affected by the normal operations of the latter. This mode of operation of this tension device is of course due mainly to the fact that the cord passes off from the gripe of the plates B and C in the particular direction shown and described, and hence, it will be understood, it is an important feature of this part of my improved contrivance that that eye E through which the cord first passes shall be located relatively to the plates B and C so that the cord  $x$  shall pull on the plate C in the described direction. When the next gavel is to be encircled by and tied up in the cord to form another sheaf the cam I will have come round again, and will operate to turn the lever H again into the position seen in the drawings, thus increasing the tension on the cord at the proper time to be again diminished to give up slack, and so on.

It will be understood that for the purposes of some machines that part of the contrivance described as involving the first part only of my invention may be used with more or less advantage separately from the rest of the contrivance I have shown; and that shown in con-



nection with the adjustable and regular tension device B C—the second part of my invention, relating to the automatically-variable tension device—may be employed with more or less advantage under some circumstances separated from the spring-plate devices C B, or even independently of any preceding tension device.

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

1. The combination, with the cord-receptacle and an adjustable tension device composed of a stationary plate, B, and a yielding plate, C, of an eye or guide for giving direction to the draft of the cord designed to pass through said tension device, such that the draft of the cord will, in the event of the presence of a knot or bunch thereon, operate to instantly pull the plate C away from B, substantially as described.

2. In combination with the means for exerting a uniform tension on the cord as it is drawn from the source of supply, the auxiliary tension device or mechanism to create an increased tension, at certain times, and regulated in its times of action automatically by the binder or harvester mechanism.

3. In a self-binder harvester, the automatic auxiliary tension mechanism, as described, to alternately create a tension on the cord and a slack therein, made in the process of applying the tension, substantially as and for the purpose set forth.

The foregoing specification signed by me this 13th day of August, 1879.

JOHN F. APPLEBY.

Witnesses:

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GEORGE A. JARIM.