(No Model.) 3 Sheets—Sheet 1.

J. F. STEWARD.

GRAIN BINDER.

No. 504,373. Patented Sept. 5, 1893.

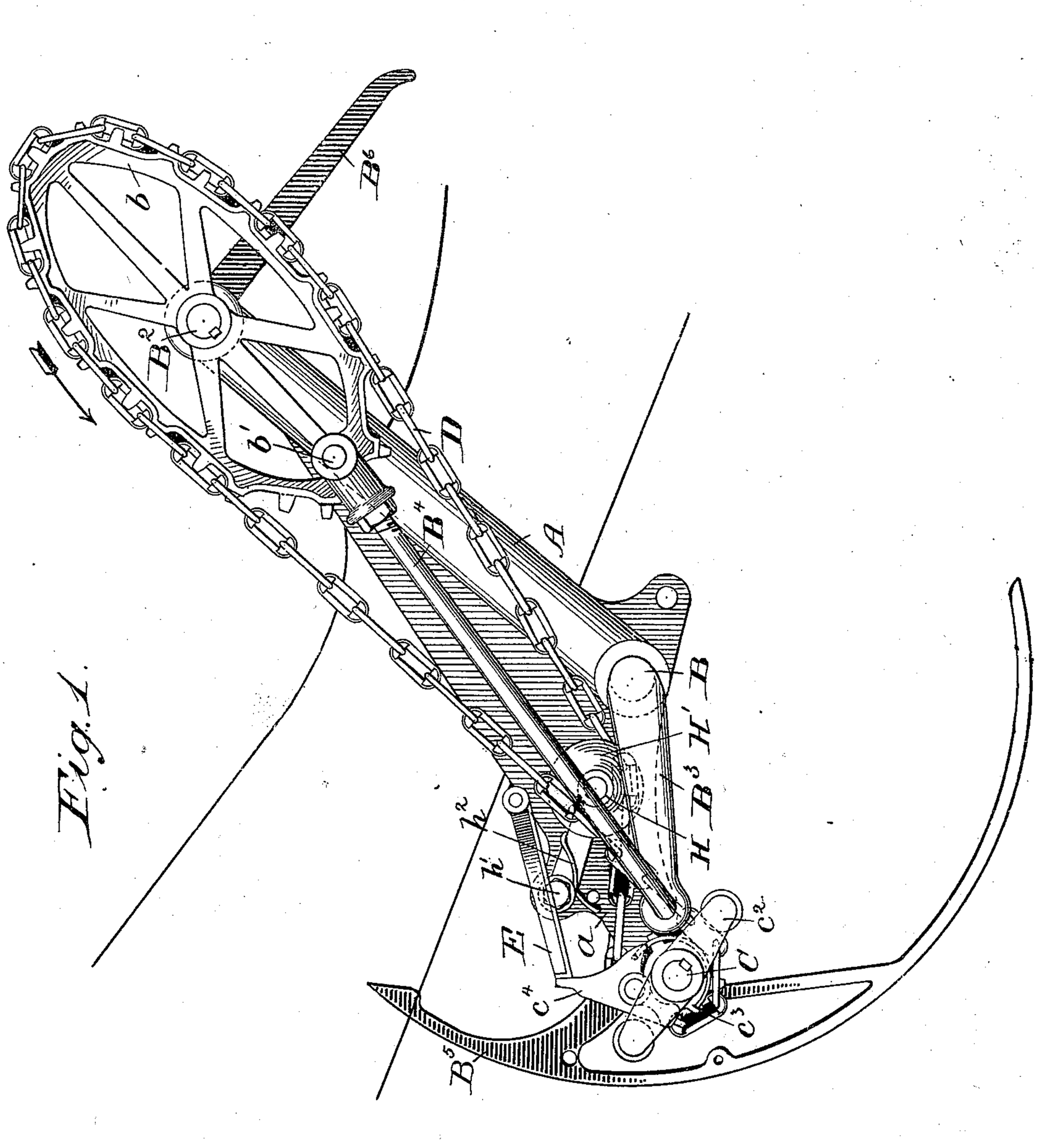

Fig. 1.

Witnesses.
Arthur Johnson.
Frank Getman

Inventor.
John F. Steward

(No Model.) 3 Sheets—Sheet 2.

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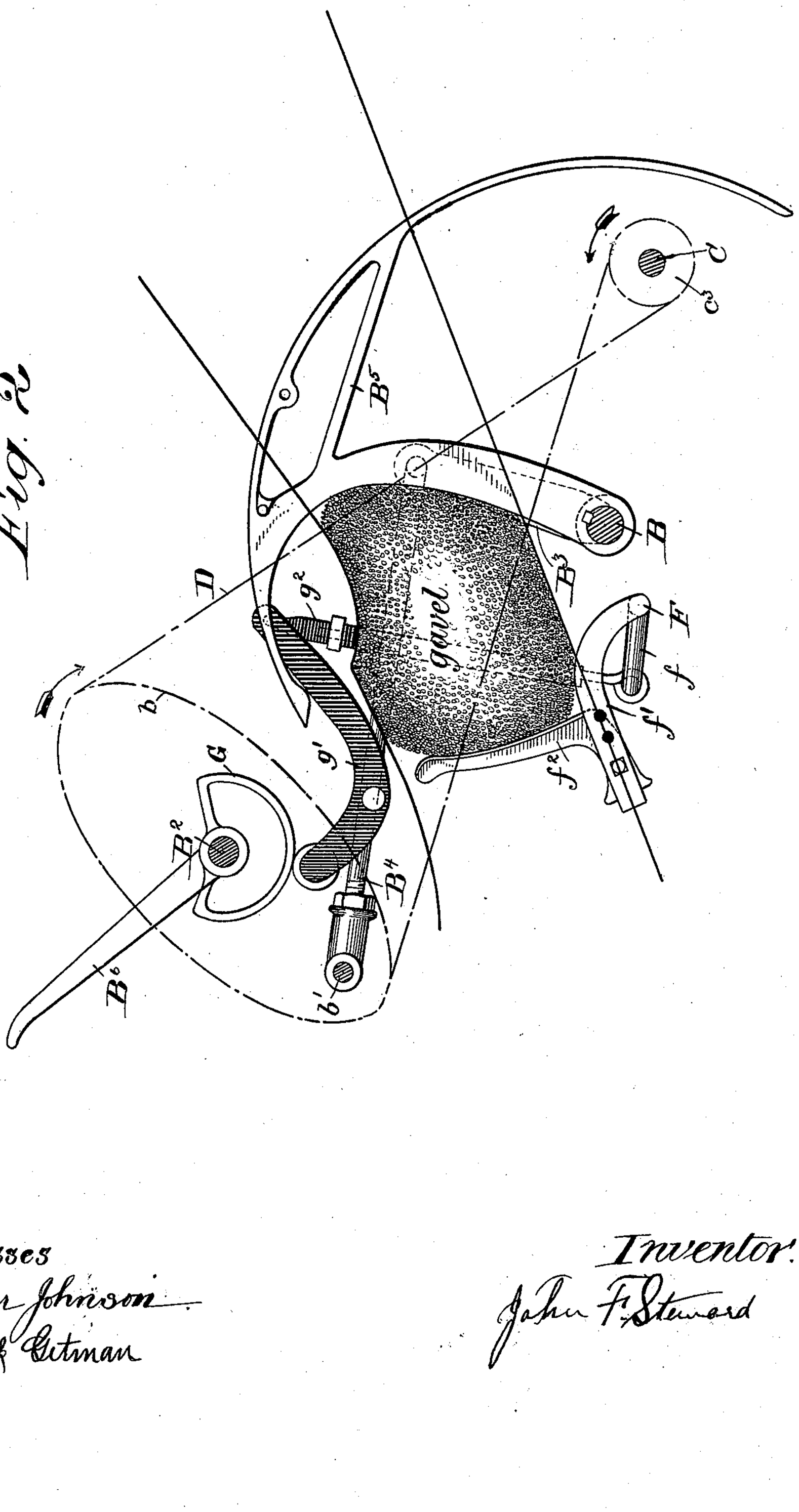
Fig. 2.



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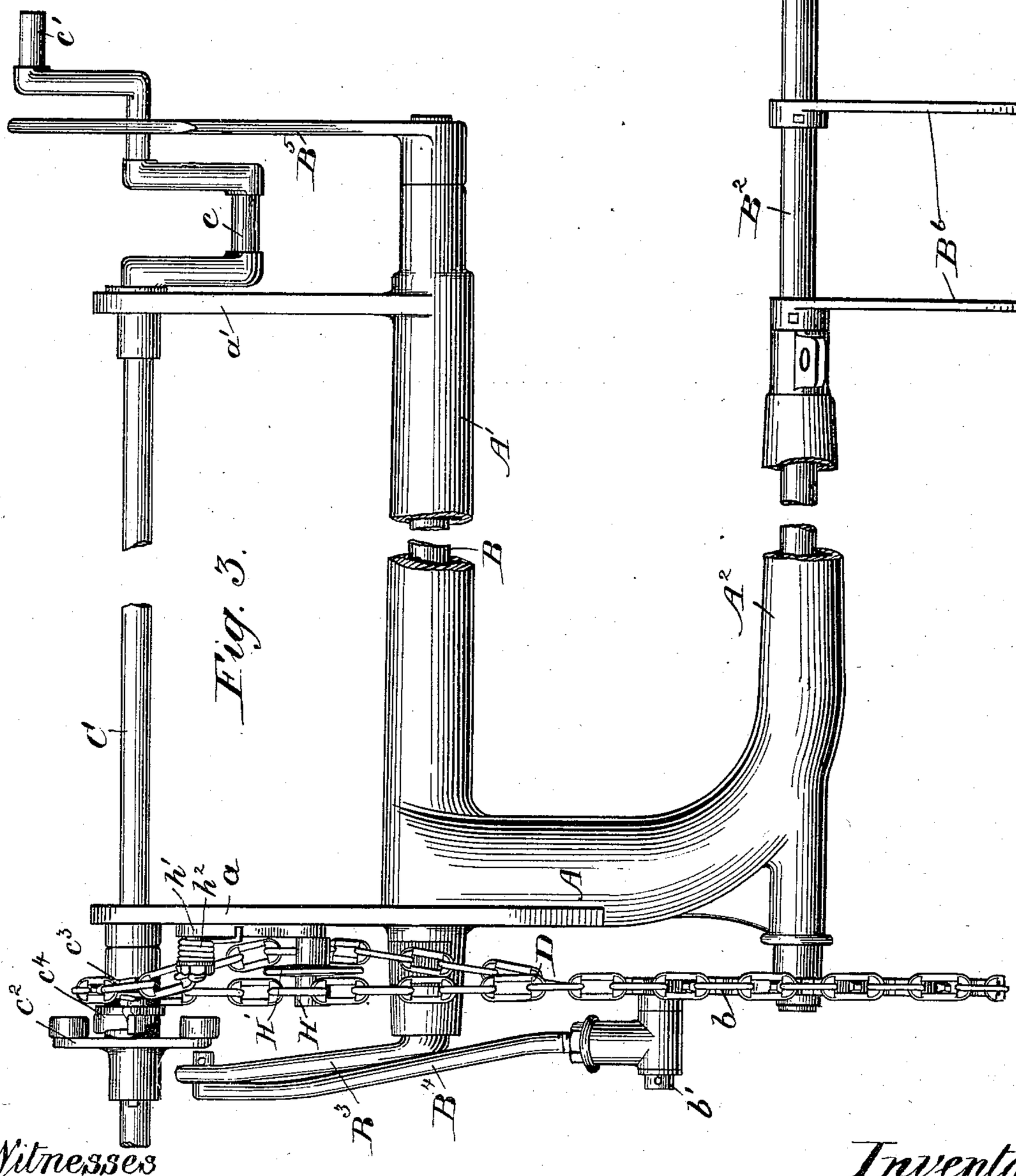

Fig. 3.

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UNITED STATES PATENT OFFICE.

JOHN F. STEWARD, OF CHICAGO, ILLINOIS.

GRAIN-BINDER.

SPECIFICATION forming part of Letters Patent No. 504,373, dated September 5, 1893.

Application filed April 19, 1893. Serial No. 471,045. (No model.)

To all whom it may concern:

Be it known that I, JOHN F. STEWARD, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Grain-Binders, of which the following is a full description, reference being had to the accompanying drawings, in which—

Figure 1 is a rear elevation. Fig. 2 is designed to illustrate the action of the elliptic sprocket wheel, and Fig. 3 is a plan view of such parts of the binding attachment as necessary to exemplify my invention.

The object of the invention is to convert the regular rotary motion of the driving shaft C, into an irregular one in the shaft B^2, so that the parts directly instrumental in binding may be given irregularity in speed and consequently while little power is required during the operation of binding, the binding devices may move rapidly, and while the operations of compressing the gavel and of discharging the bundle are taking place the parts instrumental in performing those operations may be given a slow rate of speed, and as a result be moved with more force.

Another object of my invention is to reduce the amount of gearing necessary to transmit motion from the continuously moving shaft to the binding devices. To accomplish the last object I employ a crossed chain thrown around a sprocket wheel upon the continuously moving driving shaft, and that upon the shaft from which all parts of the binder directly concerned in the operation of binding are moved. The irregularity of movement required to make the first part of my invention effective I accomplish by means of an elliptic sprocket wheel upon the shaft that gives motion to the various parts of the binder. The means by which both objects are accomplished will be quickly apprehended by referring to the drawings in which—

A is the body portion of the main frame of the binding attachment to a self-binding harvester; A′, a sleeve-like portion in which the needle shaft B, is supported and journaled; A^2 a sleeve-like portion in which the knotter driving shaft B^2 is supported and journaled. Upon this shaft are placed the knotting device and bundle discharging arms. The knotting devices, however, are omitted for the sake of clearness, but may be understood as present.

In outreaching arms a and a' is supported and journaled the packer shaft C, having the usual cranks c, c'. Upon the shaft B^2 I secure the sprocket wheel b, provided with the wrist b'. Upon the needle shaft B, is the crank arm B^3, and connecting the wrist b' and the extremity of the crank B^3, is the pitman B^4. Upon the packer shaft I key the driver c^2, and loosely upon the said shaft place the sprocket wheel c^3. Upon the said sprocket wheel is also pivoted the spring controlled driving dog c^4, adapted, when permitted, to engage the anti-friction rollers on the driver c^2. Around this sprocket wheel and that of b, is the chain D. It will be noticed that this chain is of somewhat peculiar construction, but is selected as one better adapted to my present purpose than those usually used for communicating motion on harvesting machinery. The chain here shown is that patented to J. M. Dodge, No. 264,139, dated September 12, 1882, and will be described no further than to say that its links are of the ordinary trace-chain kind, but have saddles between them to give sufficient wearing surface to make the joints durable. I have chosen this chain because it is more easily crossed than the flat Ewart chains found on the market. Other forms of chain may be used, however. It is but necessary that the sprockets of the wheels should be made to properly fit whatever chain is selected. As in this chain the links rest upon the sprocket wheels alternately flatwise and edgewise, I adapt each alternate sprocket to pass into the opening of the chain link, and the remaining sprockets to rest only upon the sides of the links that stand edgewise upon the wheels. A tripping arm E is pivoted to the binder frame and may be connected to the compressor in any way that will cause the increase of the accumulating gavel to engage the clutching device. As I propose nothing new in the last named devices I omit all connections, for the sake of clearness.

F is the compressor shaft having the crank f, and the arm f', upon which is adjustably secured the compressor arm f^2. This opposes the needle B^5, in the usual manner, and by

means of the cam G, through the instrumentality of the lever g' and the link g^2, is raised to position for receiving the grain, and lowered to permit the discharge of the bundle. The cam G is so made that the compressing arm is slowly moved against the gavel at the time that the needle is moving to its position of laying the band around the bundle, during which time it also serves as one element of the compressor.

In order that the crossed chains may pass each other with as little friction as possible, I provide the anti-friction roller H, and form upon it the high flange H'. This anti-friction roller serves as a take-up for any slack in the chain, being pivoted at h' upon the main frame, and in order that it may be automatic in its action I provide the spring h^2 which forces it downward upon the lower portion of the chain which is, in this case, the slack part, the strains necessary to rotate the wheel b in the proper direction being upon the upper portion of the chain.

I do not attempt to so regulate the ellipticity of the wheel B that there shall be as little slack in the chain as possible during certain parts of the rotation, but on the contrary, make the major and minor diameters of the wheel as I choose in order to effect variation in speeds that I consider best, the spring h^2 causing the anti-friction roller to take up whatever slack may at times exist. The flange H', upon H, deflects the loose portion of the chain sidewise so that it may pass the other part. It will be observed that I so place the tightener that its axis shall be between the two parts of the chain and permit one part of the chain to be upon one side of the flange, and the other upon the other side. The result is that both parts of the chain are in rolling contact with the tightener, and hence the friction and chafing action are reduced.

In Fig. 1, the parts are shown in their positions of rest, and the effective radius of the sprocket wheel b is at its least so that the said wheel will be started quickly in the direction indicated by the arrow, but as it advances the effective radius becomes greater, and when the parts have assumed the position shown in Fig. 2, the chain is acting upon the major radius and the angular velocity reduced. At this time the bundle is being compressed, and if the proportions given be adhered to, nearly twice the power is imparted during the operation of compressing than can be exerted when the wheel b has moved another quarter revolution. After compression is accomplished, little power is again required until the discharge arms B^6, come in contact with the gavel, at which interval the wheel b is passing through the third quarter of its revolution, and the chain is then pulling upon the major radius. If it is not desired to cross the chains, any form of chain may be used, and the reversed motion of rotation be accomplished by the ordinary means found upon chain-driven grain binding attachments.

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

1. In a grain binder, in combination with the parts directly concerned in the operation of binding, and with the continuously moving driving shaft C, the sprocket wheel c^3, the elliptic sprocket wheel b, and the chain connecting said sprocket wheels, substantially as described.

2. In combination with the continuously running shaft C, and the shaft B^2 from which all of the parts of the binder directly concerned in the operation of binding are moved, the sprocket wheel c^3, the elliptic sprocket wheel b, and the crossed chain D, all combined, substantially as described.

3. In combination with the packer shaft C and the shaft B^2 that gives motion to the parts directly concerned in the operation of binding, the sprocket wheel c^3 upon the former, and the sprocket wheel b upon the latter, and having the crossed chain thrown thereabout, and the centrally flanged antifriction roller H, all combined substantially as described.

4. In combination with the packer shaft C and the shaft B^2 that gives motion to the parts directly concerned in the operation of binding, the sprocket wheel c^3 upon the former, and the sprocket wheel b upon the latter, and having the crossed chain thrown thereabout, and the elastically held centrally flanged anti-friction roller, all combined substantially as described.

JOHN F. STEWARD.

Witnesses:
M. B. HART,
CECIL N. SMITH.