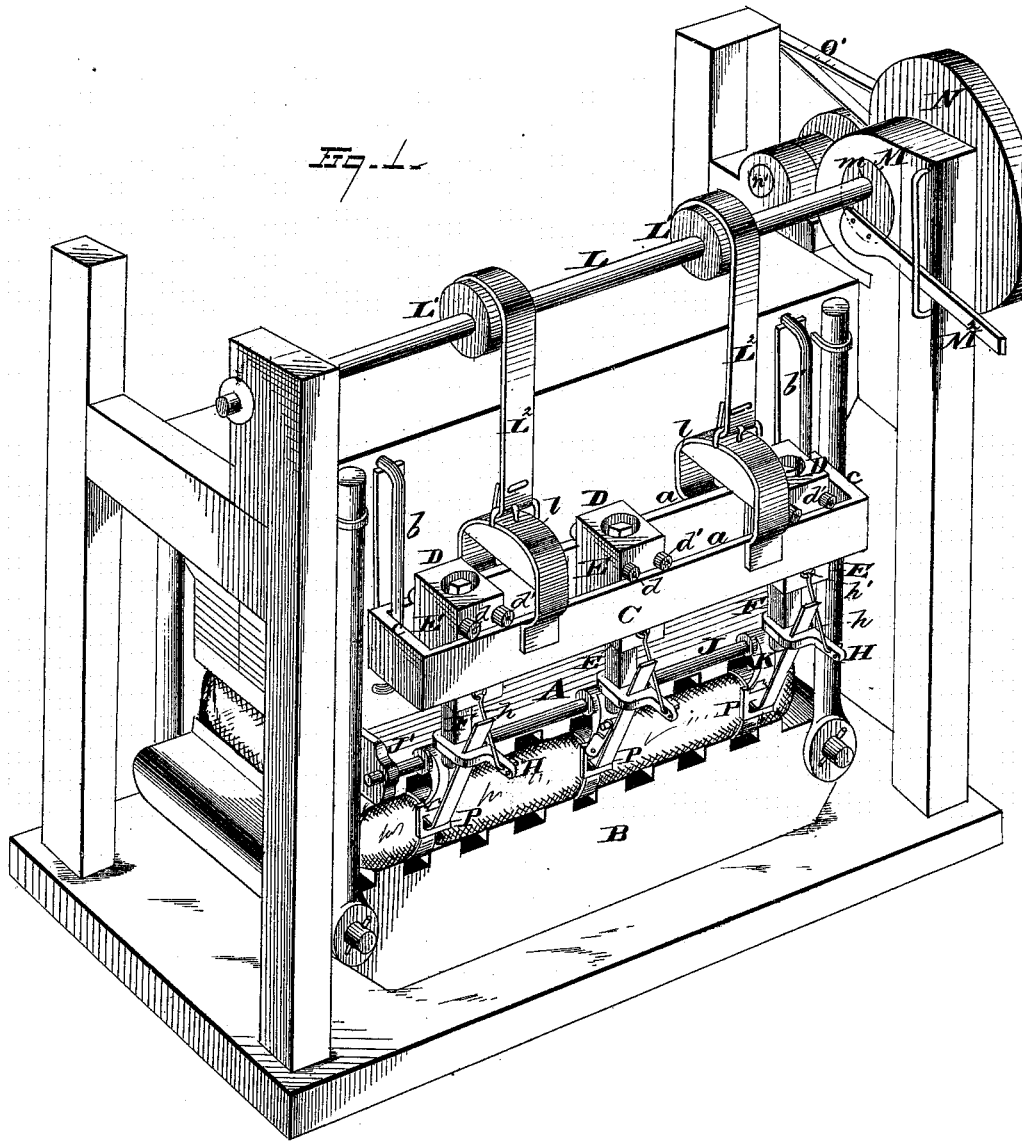


S. HUGHES.
BALE-BAND TIGHTENING-MACHINES.

No. 195,449.

Patented Sept. 25, 1877.



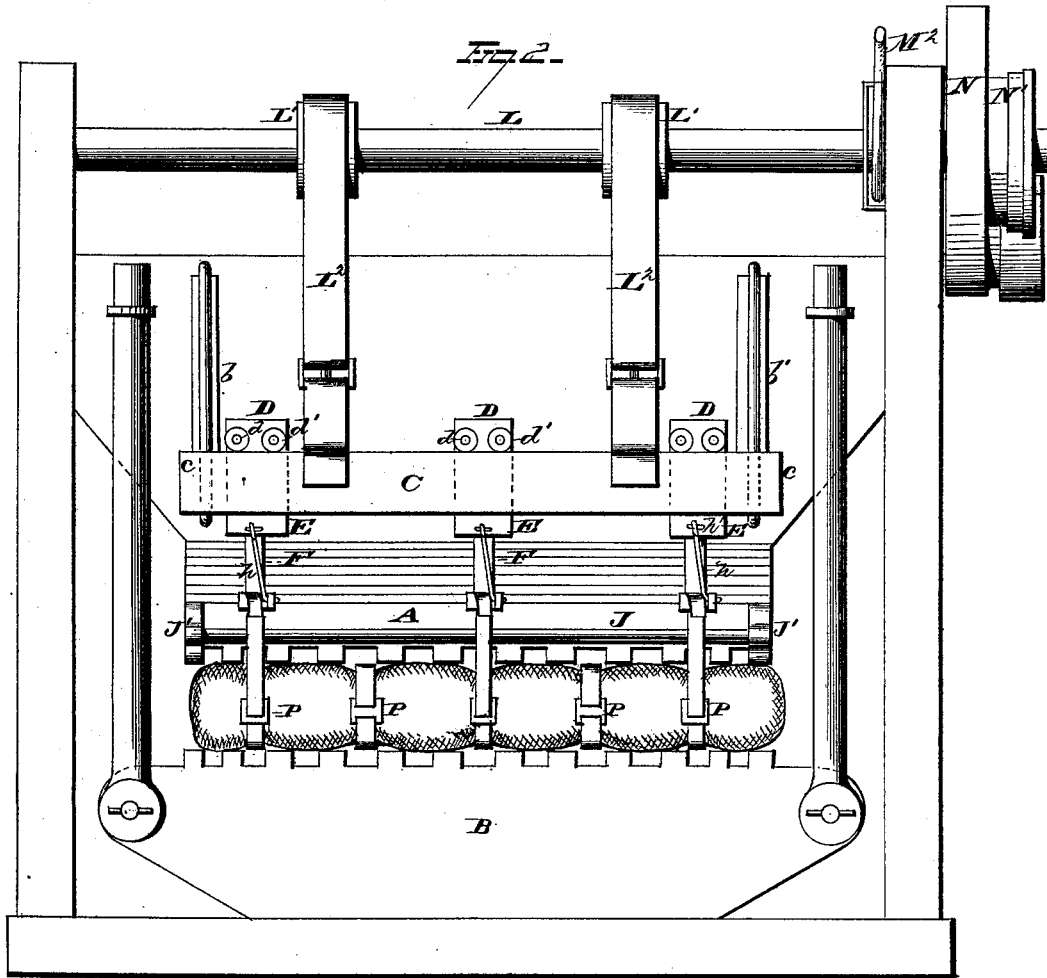
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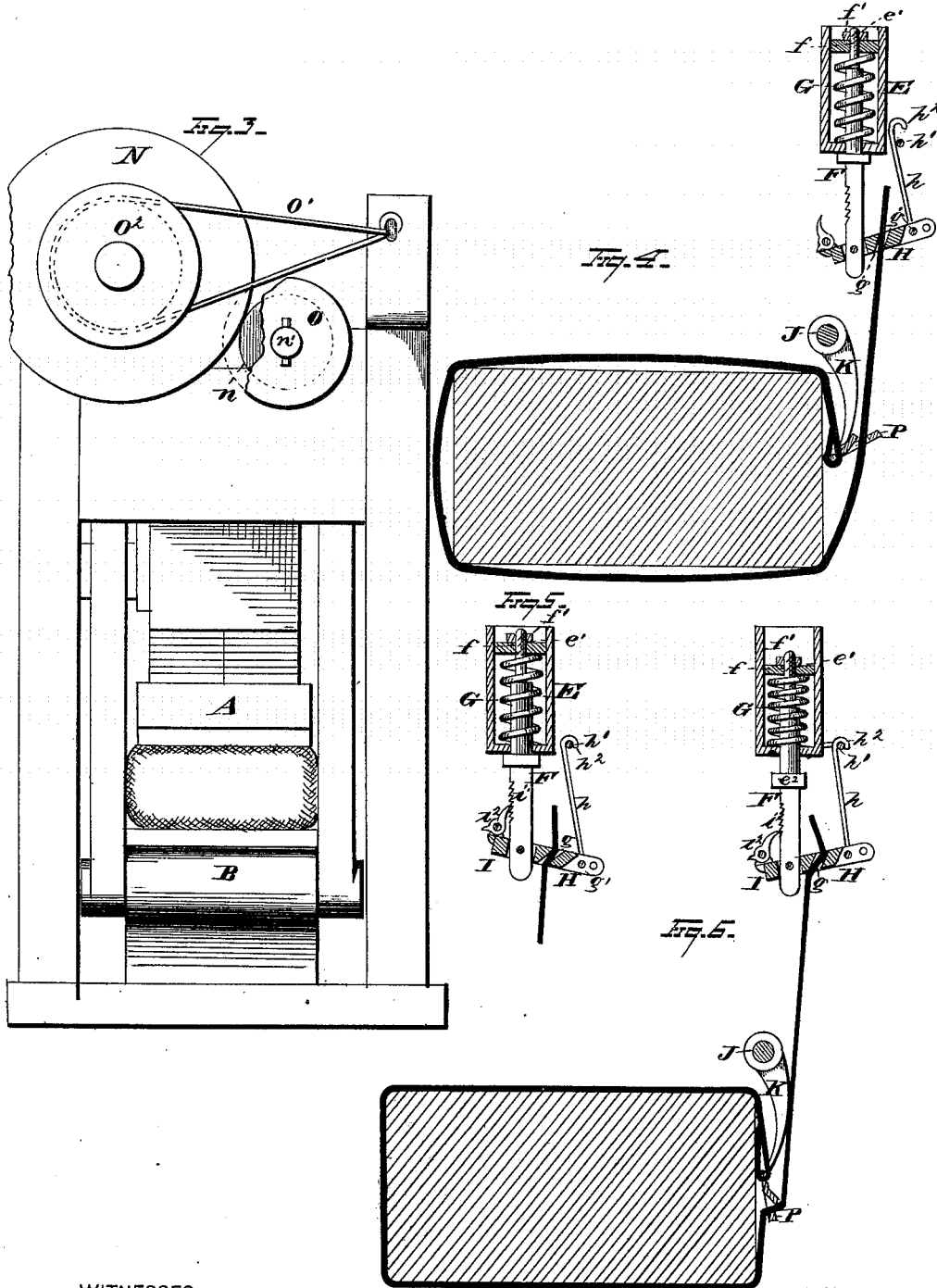
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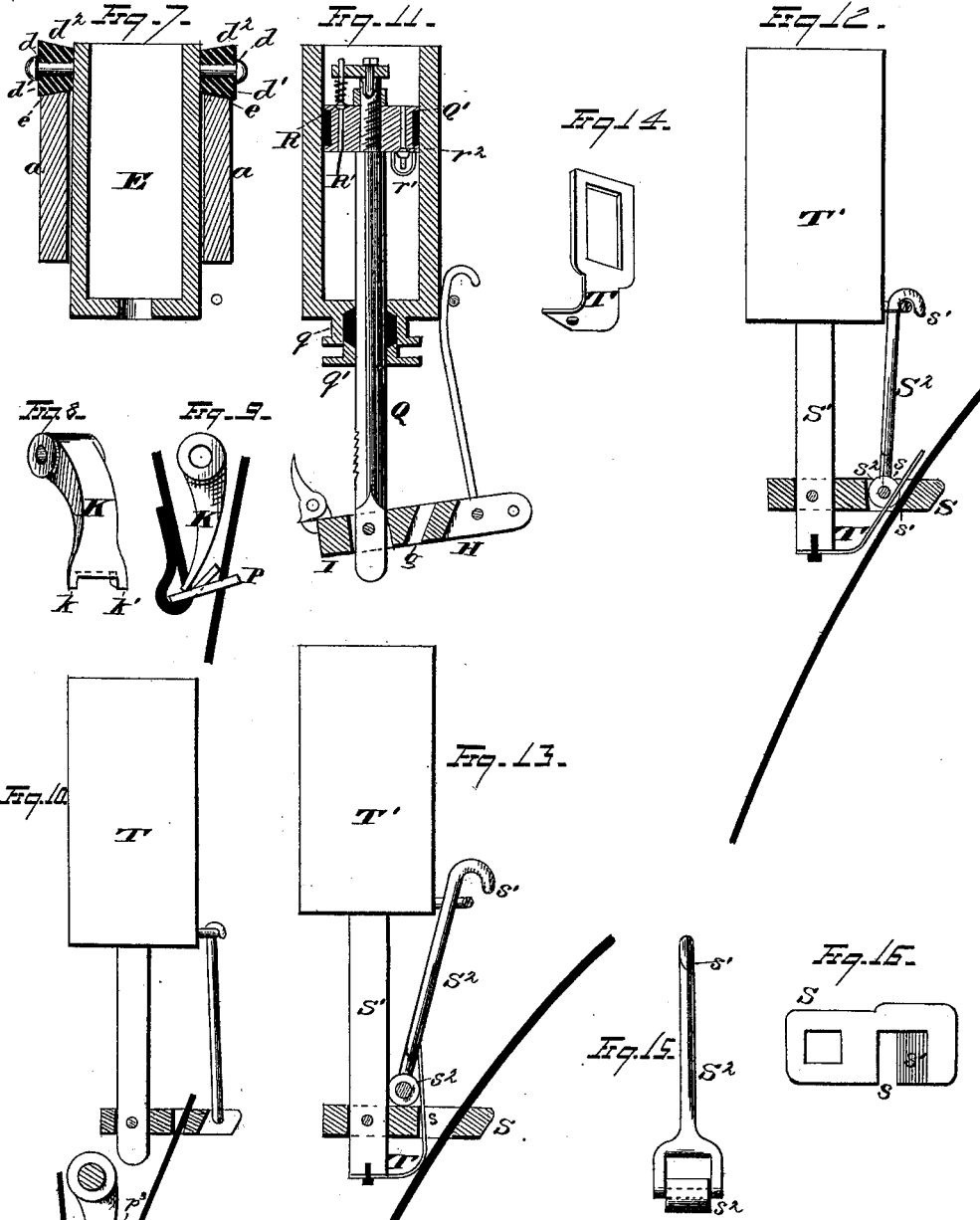
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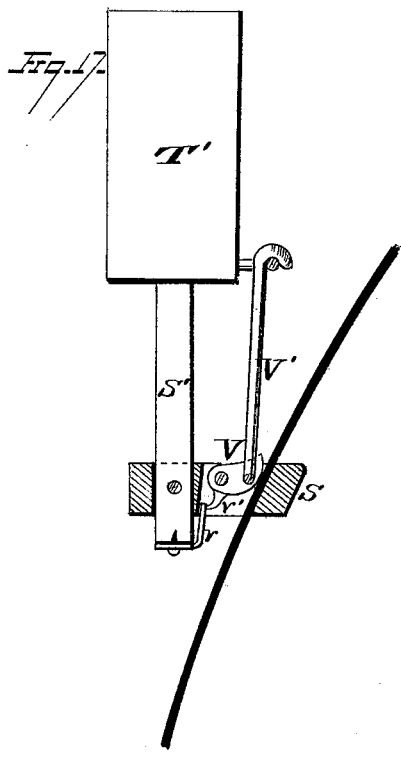
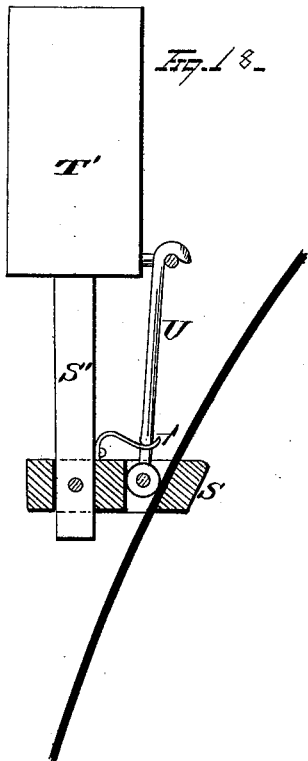
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UNITED STATES PATENT OFFICE.

SAMUEL HUGHES, OF CHARLESTON, SOUTH CAROLINA.

IMPROVEMENT IN BALE-BAND-TIGHTENING MACHINES.

Specification forming part of Letters Patent No. 195,449, dated September 25, 1877; application filed August 22, 1877.

To all whom it may concern:

Be it known that I, SAMUEL HUGHES, of Charleston, in the county of Charleston and State of South Carolina, have invented certain new and useful Improvements in Band-Tightening 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 pertains to make and use it, reference being had to the accompanying drawings, which form part of this specification.

My invention relates to an improvement in band-tightening machines.

The object of this invention is to provide cotton and other presses with band-tighteners of such a construction that any desired strain may be exerted on the several bands surrounding a bale, and when the bands have been subjected to the desired strain each band will be automatically released and the tie securely locked in place.

My invention consists, first, in a band-tightening machine provided with one or more band draft-rods, which latter are constructed and arranged to be adjusted to sustain any predetermined resistance, whereby the several bands will be subjected to a strain dependent on the adjustment of their several draft rods, and when the desired strain has been imparted the band is automatically released from said draft-rods.

My invention further consists, in a band-tightening machine, in the combination, with a vertically-moving carriage, of one or more laterally-adjustable band draft-rods, whereby the several bands of a bale may be tightened by one or more adjustable band draft-rods.

My invention further consists, in a band-tightening machine, in the combination, with a vertically-moving carriage, of one or more casings or cylinders, laterally adjustable on said carriage, each of said cylinders provided with band draft-rods and means for regulating the resistance of said draft-rods.

My invention further consists, in a band-tightening machine, in the combination, with a revolving shaft adapted to be thrown in or out of engagement with the motive-power, and a vertically-moving carriage provided with adjustable band draft-rods, of flexible connec-

tions between the carriage and shaft, whereby any desired strain may be exerted on each of the several bands, while the carriage has a continuous vertical movement imparted thereto, and means for automatically releasing each of said bands when the desired strain has been exerted thereon.

My invention further consists, in a band-tightening machine, in the combination, with a cylinder or casing provided with a piston having a band draft-rod connected therewith, of suitable means for connecting the draft-rod and cylinders in a yielding manner, whereby the draft-rod will be moved away from its cylinder whenever the strain exerted thereon exceeds the resistance between the piston and head of its cylinder.

My invention further consists in the several details of construction and combinations of parts, as will more fully appear from the following description and claims.

In the accompanying drawings, Figure 1 is a view, in perspective, of my improved band-tightening machine as applied to a cotton-press. Fig. 2 is a front elevation of the same. Fig. 3 is an end view of the cotton-press. Fig. 4 represents one of the band draft-rods in position for receiving the free end of the band. Fig. 5 shows the position of the draft-rod and the parts connected therewith when strain is being exerted on the band. Fig. 6 shows the band draft-rod and its attachments in position for automatically releasing the band. Fig. 7 is a vertical section taken through one of the draft-rod cylinders and the trackways of the carriage supporting the same. Fig. 8 is a view, in perspective, of the buckle stop or clutch. Fig. 9 is an edge view of the buckle, having the band ends inserted therein, and the stop or clutch in position. Fig. 10 shows the buckle stop or clutch, provided with a falling weight to automatically form a bend in the end of the band. Fig. 11 is a modified form of band draft-rod mechanism, liquid being used in this instance as the resisting medium in lieu of a spring, as illustrated in Figs. 4, 5, and 6. Fig. 12 represents a modified form of clutch mechanism, the band being secured in the clutch. Fig. 13 shows the position of the several parts represented in Fig. 12 as they appear when the band is au-

tomatically released from the band-clutch. Fig. 14 is the spring for throwing the locking device out of contact with the band. Fig. 15 is the locking-roller. Fig. 16 is a modification of the band-clutch. Figs. 17 and 18 are modifications of band-clutching mechanism.

A and B are, respectively, the upper and lower platens of any power-press.

As my improvement is adapted for use in connection with any style of press, it is not necessary to give a detailed description of the several parts of such a machine, but simply explain the construction and operation of the improvement as applied to the platens of an ordinary power-press.

C is a carriage, having tracks or roller-ways *a*. This carriage is secured to the upper platen A by means of guides *b b'*, which latter are arranged to fit against the ends *c* of carriage C, and prevent any transverse movement of the same, while allowing its free vertical movement on the front face of the upper platen.

It is evident that trackways may be substituted for the guides and rollers journaled in the ends of the carriage, and adapted to traverse the trackway, thus reducing the friction and wear of the parts.

D represents the independent band-draft mechanisms, each of which is constructed as follows: E are hollow cylinders or casings, the exterior surfaces of which may be either square or cylindrical in form. Cylinder E is provided with trunnions *d*, one or more on its front and rear side, upon which are loosely secured rollers *d'*, which latter are preferably constructed with an inclined or conical tread, *d''*, as shown in Fig. 7. As the rollers *d'* travel on the outwardly-inclined tracks *e* of the carriage, the power exerted on the rollers serves to draw the tracks toward the carriage, and thus prevent the breakage of the carriage.

Instead of employing rollers with conical treads, they may be formed with double flanges to project over the sides of the trackways, and likewise prevent the latter from spreading. The cylinders or spring-casing E is open at its upper end, while the lower end is provided with a perforated head, through which passes the band draft-rod F, the latter being preferably provided with a collar, *e'*, which abuts against the head of the casing. The upper end of rod F is screw-threaded at *e''*. A spiral spring, G, is placed around that portion of rod F situated within the casing, the lower end of the spring resting upon the lower head of the casing or cylinder. Upon the upper end of the spring is placed a piston, *f*, the same adapted to be adjustably secured by means of the nut *f'* engaging with the threaded upper end of the draft-rod.

To the lower end of the band draft-rod F is pivoted the band-clutch H, which is provided with an inclined slot, *g*. The outer end or long arm of the clutch has one or more openings, *g'*, for the adjustable attachment of the lower end of the clutch-rod *h*, the upper end

of which passes through an eye or staple, *h'*, secured to the spring cylinder or casing, and is prevented from displacement by means of a nut or by forming a bend, *h''*, on the end of the clutch-rod. The lower end of the band draft-rod F is preferably provided with ratchet-teeth *i* on one side for the engagement of a pawl, *i'*, which latter is pivoted to the short arm I of the clutch-bar H, the purposes of the same being hereinafter fully set forth.

A shaft, J, is journaled in bearings J' secured to the front face of the upper platen in close proximity to its working-face. Upon this shaft are loosely secured the buckle-stops K, which are constructed with side prongs *k k'* to bear upon the side walls of the buckles or ties.

The carriage is raised and lowered by means of mechanism constructed as follows: L is a shaft, the ends of which are supported in bearings secured to the side frames of the press. To shaft L are secured the band-wheels L¹, one or more.

The upper ends of bands L² are rigidly secured to said band-wheels, while their lower ends are attached to the carriage-supports *l*, the latter being formed to project laterally from the outer surface of the trackways to allow the spring casings or cylinders to be moved from one end of the carriage to the other through said supports.

Any construction of band L² may be used; as, for instance, a flat metallic band may be employed with good results; or a wire rope or chain may be used in lieu of flat bands, if so desired.

Shaft-bearing M is circular in form, and the opening *m* for the shaft is formed eccentrically with the periphery of said bearing, whereby the latter, when partly revolved by means of the hand-lever M², serves to impart a lateral movement to the shaft L and pulleys N O² secured to its outer end.

N is a friction-pulley, and by moving the shaft it may be thrown either in or out of engagement with a friction-pulley, *n*, on the counter-shaft *n'*. O is a driving-pulley keyed to the counter-shaft *n'*, and is driven by a belt from an engine, or from any suitable driving-shafting. A band friction-brake, O¹, has its ends secured to the press-frame, and surrounds the flanged brake-wheel O².

While the means above described are adapted to impart sufficient power to raise the carriage, and thus exert the desired tension on the several bands, I would have it understood that I do not limit myself to these devices, as it is evident that many other arrangements of parts might be employed and produce equivalent results.

Instead of using the devices shown and described for raising the carriage, the latter may be connected to the lower ends of two or more piston-rods, and either live steam or the exhaust steam from the cotton-press cylinder be used to raise the carriage.

The operation of the machine is as follows:

The bale having been compressed to the desired density, the bands are then inserted through the grooves in the faces of the upper and lower platens. Buckles P are secured to the upper ends of the several bands while the lower or free ends are passed through the other slot in the buckle, and the ends then inserted in the inclined slots of the band-clutches. After the several bands have been thus secured the buckle-stops are turned down, so that the side prongs of each stop will rest on the side bars of each buckle, and effectually lock the several buckles in place and prevent their upward movement. The laterally-moving friction-pulley is then thrown in engagement with the continuously-revolving friction-pulley. This operation serves to revolve the shaft and wind the bands L² about their band-wheels, and thus draw the carriage in an upward direction.

Prior to starting the machine the several springs in the spring-cases will have been adjusted to the required tension—that is, the adjusting-nut must be turned down against the piston until the spring between the piston and lower head of the casing is compressed to such an extent that its expanding force will equal the desired force to be applied to the band. For instance, it may be found that the bands at the ends of the bale need to be drawn more closely than those at the center, and in such case the springs in the end casings are subjected to greater compressing action than the springs at the middle portion of the bale. As the carriage with its spring cases or cylinders is being raised, it will be understood that the relative positions of the cylinders, draft-rods, and band-clutches will remain unchanged until the bands have had a pulling force exerted on them equal to the resisting force of the springs. When this has been effected the band draft-rods F become stationary as the force acting on their opposite ends is neutralized. The casings or cylinders still keep moving in an upward direction, and the clutch-rods pull the outer ends of the band-clutches in an upward direction, as illustrated in Fig. 6, until the inclined slots in the several band-clutches come in line with the line of resistance, or, in other words, in line with the free end of the band, when the latter is automatically released and secured in position by the buckle.

The above description presupposes that the several bands are of equal length, and that they are all to be subjected to the same tension. If such is not the case, the machine will operate in substantially the same manner, as, for instance, if the end bands are to be drawn more firmly than the middle bands, the springs of the end casings are more tightly compressed than those of the central casings, and hence, when a continuous upward movement is imparted to the carriage, the bands at the center of the bale will be first released, and, as the carriage still continues to ascend, the end bands will be drawn with steadily-increasing

power until the resistance is equal to the power exerted by the springs, when the bands will be automatically released.

When the bands are of different lengths the desired pressure is invariably produced on each portion of the bale, as each band will be subjected to a predetermined pressure, regardless of its length or position on the bale. As the long arms of the band-clutches are drawn in an upward direction, the short arms carrying the pawls are correspondingly depressed, and the pawls, by their engagement with the ratchet-teeth on the draft-rods, operate to retain the band-clutches in position for releasing the band.

It will be observed that, when the lever adapted to impart a lateral movement to the shaft is in its raised position, it serves to force the friction-wheels in contact with each other, and consequently revolve the shaft. When the carriage is to be locked in a raised position, the lever is depressed to its lowest point, and this causes the band-brake to hold the friction-wheel in a fixed position, and thus prevent the turning of the shaft. When it is desired to lower the carriage, the lever is raised to a central position, which operates to free the friction-wheels and friction-brake, and allow the carriage to descend by its gravity. The carriage can be readily raised out of the way when the shifting-boards *p* are to be inserted or removed.

From the foregoing description it will be readily understood that all the bands of a bale may be tightened by means of a single band draft-rod, if desired, as the casing to which the rod is combined is adapted to be moved laterally on the carriage, and thus bring the draft-rod in line with any of the buckles on the band.

The preferable construction of machine is one provided with as many band draft-rods as there are bands on the bales, as in such cases the bands may be tightened simultaneously, and the work performed by a single stroke of the carriage.

Instead of using the buckle-stop shown in Figs. 8 and 9, the stop represented in Fig. 10 may be employed. Stop *p* has pivoted thereto a swinging frame, *p*², in the outer end of which is secured a weight, *p*³. When the band is released from its clutch the weight *p*³ falls against the free end of the band and bends it over the buckle, thereby automatically locking the band to the buckle.

Fig. 11 shows a modified form of draft-rod mechanism. In this instance the lower head of the cylinder is provided with a stuffing-box, *g*, and gland *g*', to securely pack the draft-rod Q. In this form of apparatus the piston Q' is suitably packed, and water or other liquid inserted in the cylinder. The resistance to the descent of the piston is regulated by a valve, R, which closes downwardly over a port, R', extending through the piston. Valve R is held against its seat by means of a weight or spring, which is adapted to be

regulated as desired. The spring or weight having been adjusted to afford the resistance required—that is, a resistance equal to the power to be imparted to the band—the draft-rod and piston will remain stationary relatively to the cylinder until the resistance of the band is greater than that of the weight of the spring or weight, when the cylinder will be carried upwardly with the carriage, while the piston and draft-rod remain in a fixed position, causing the liquid to escape past the valve R. The liquid that has escaped upwardly through the port R' is allowed to flow back beneath the piston through a port, r^2 , which latter extends through the piston, and is governed by an upwardly-closing check-valve, r^1 .

Figs. 12, 13, 14, 15, and 16 represent a modified form of band-clutch and releasing mechanism. In this instance the band-clutch S is provided with a wedge-shaped slot, s , the inclined side s^1 of which is preferably serrated, as shown in Fig. 16. Clutch S is securely attached to the band draft-rod S¹. A rod, S², has a hook, s^4 , formed on its upper end, while its lower end is furnished with a roller, s^2 . A slotted spring, T, is secured at one end to the lower end of the draft-rod, while its free end bears upon the lower end of the rod S².

In Fig. 12 the roller s^2 is firmly locked between the band and wall of the band-clutch.

When the band has been drawn to the required tension the cylinder T' continues to ascend, as heretofore described, and this operation serves to release the roller, which latter is thrown out of engagement with the band by the spring T.

Instead of employing a slotted spring, T, the spring may be secured to the side of the draft-rod, as represented in Fig. 18, and the free end, t , thereof be inserted between the roller-arms of the rod U.

Another form of engaging and releasing mechanism is illustrated in Fig. 17. In this example a cam, V, is used in lieu of the roller. The lower end of the rod V' is attached to the cam, while a spring, v , bears on a toe, v' , secured to the cam or the rod to which it is attached.

When the draft-rod is stationary, and the cylinder continues its upward movement, the cam will be released, and thus operate to automatically release the free end of the band.

While I have demonstrated that my invention is susceptible of being embodied in a variety of forms of construction and arrangement of parts, it is evident that many other modifications in the several parts of my machine might be devised, and yet fall within the spirit and scope of my invention, which consists, broadly, in a band-tightening machine adapted to impart any predetermined strain on each of the several bands, and, when the desired strain has been effected, to automatically release the bands.

The employment of a machine constructed

in accordance with my invention, as above set forth, will allow of more rapid and satisfactory work than where the bands have been secured by hand.

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

1. A band-tightener provided with band draft-rods and means for adjusting the same to resist any desired force, substantially as set forth.

2. The combination, with the face of the platen of a press, of a vertically-movable carriage carrying laterally-adjustable band-draft mechanism, substantially as set forth.

3. The combination, with the platen of a press and a vertically-movable carriage, of one or more band draft-rods, and means combined therewith whereby any desired tension may be imparted to the several bands on a bale, and the band ends automatically released when the desired tension has been secured, substantially as set forth.

4. The combination, with a vertically-movable carriage, of one or more casings or cylinders provided with rollers having conical or inclined treads, substantially as set forth.

5. The combination, with a band draft-rod, the upper end of which is secured in a yielding and adjustable manner within a casing or cylinder, of a band-clutch secured to the lower end of said draft-rod, and means for automatically releasing the band from the clutch when the desired power has been exerted on the band, substantially as set forth.

6. The combination, with a band draft-rod and a casing or cylinder, of a spring one end of which rests on the lower head of the casing, while the upper end rests against a vertically-adjustable piston, substantially as set forth.

7. The combination, with a spring casing or cylinder and a band draft-rod secured therein in an adjustable and yielding manner, of a band-clutch pivoted to the lower end of the draft-rod, and a clutch-rod connecting the long arm of the band-clutch with the spring casing or cylinder, substantially as set forth.

8. The combination, with the spring casing or cylinder, of the band draft-rod constructed with a screw-threaded upper end, a piston on said draft-rod, a spring interposed between the head of the cylinder and the piston, and an adjusting-nut for regulating the tension of the spring, substantially as set forth.

9. The combination, with a spring-casing and a draft-rod secured therein in a yielding and an adjustable manner, of a band-clutch provided with an inclined band-slot, and a rod connecting the clutch with the casing, whereby the separation of the clutch and casing operates to bring the band-slot in line with the band and automatically release the same, substantially as set forth.

10. The combination, with the platen of a press, of a horizontal shaft or rod secured to the side of the platen and in close proximity

to its working-face, and of buckle-stops, one or more, adapted to be laterally adjusted on said shaft, substantially as set forth.

11. The combination, with a buckle-stop or catch, of a swinging arm or frame carrying a weight on its outer end, substantially as set forth.

12. The combination, with a vertically-movable carriage and laterally-adjustable spring cases or cylinders having band draft-rods secured therein in a yielding and adjustable manner, of one or more buckle stops or catches, the latter serving to prevent the movement of the buckle as strain is applied to the band, substantially as set forth.

13. The combination, with a revolving shaft and the vertically-movable carriage provided with laterally-adjustable band-draft mechanism, of flexible connections between the shaft and carriage, substantially as set forth.

14. The combination, with the carriage and laterally-adjustable spring casings or cylinders, of the carriage-supports constructed to project beyond the tracks of the carriage, substantially as set forth.

15. The combination, with a cotton or other press, of a band-tightener constructed to simultaneously apply the same or variable strains

on the several bands of a bale, substantially as set forth.

16. The combination, with a cotton or other press, of a band-tightener constructed to exert an equal or variable pressure either simultaneously or successively on the several bands of a bale, and automatically release said bands when the desired tension has been exerted thereon, substantially as set forth.

17. The combination, with a band draft-rod one end of which is secured in an adjustable yielding manner within a cylinder or casing, of a band clutch attached to the lower end of said draft-rod, substantially as set forth.

18. A band-tightener for cotton or other presses, wherein the draft-rods to which the bands are detachably secured are adapted to exert an equal or variable pressure either simultaneously or successively on the several bands of the bale, substantially as set forth.

In testimony that I claim the foregoing I have hereunto set my hand this 14th day of August, 1877.

SAML. HUGHES.

Witnesses:

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B. F. McCABE.