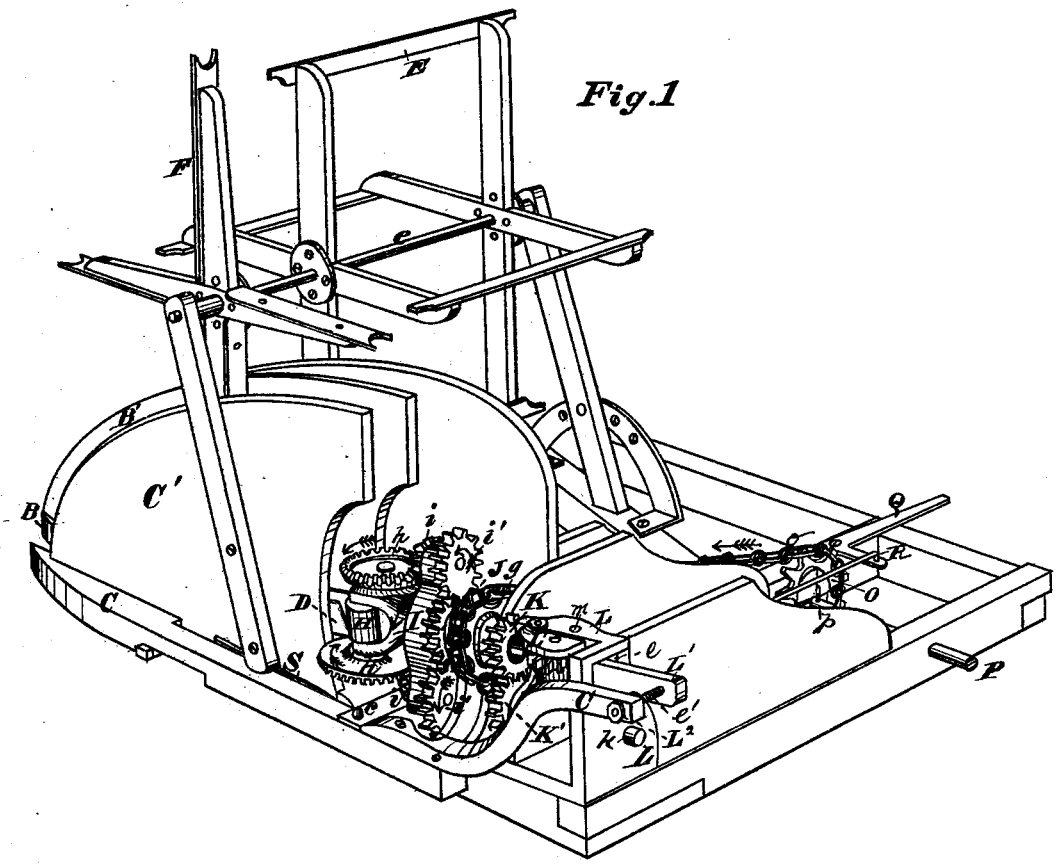
2 Sheets—Sheet 1.

G. A. HOUSTON.

GRAIN-BINDERS.

No. 187,974. Patented March 6, 1877.

Fig. 1



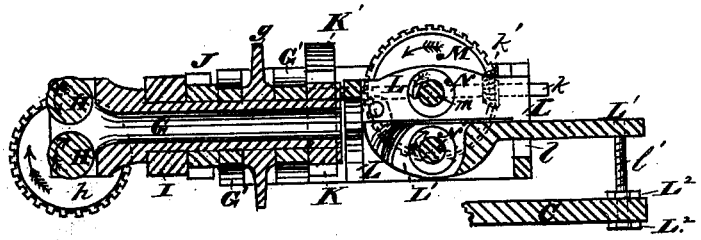


Fig. 2

Attest
W. F. Baker
L. M. Harris

INVENTOR
George A. Houston
By Osburn & Thacher
Attorneys

2 Sheets—Sheet 2.

G. A. HOUSTON.

GRAIN-BINDERS.

No. 187,974. Patented March 6, 1877.

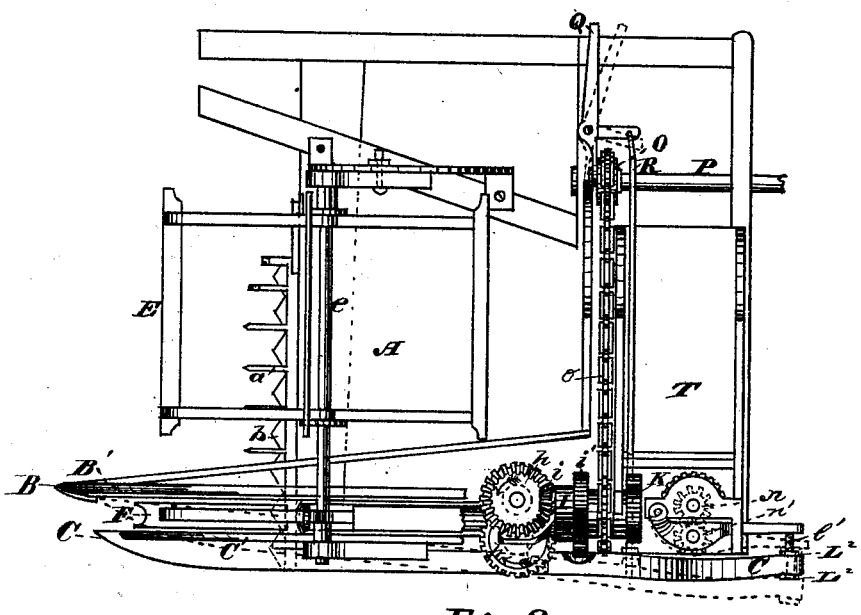


Fig. 3

Fig. 5

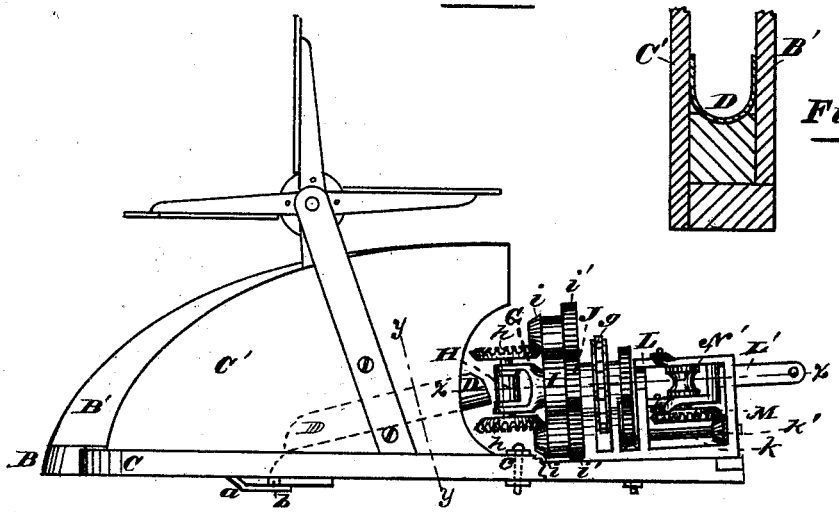


Fig. 4

Attest

W. F. Baker

L. M. Morris.

INVENTOR

George A. Houston

By Coburn & Thacher

Attorneys.

UNITED STATES PATENT OFFICE.

GEORGE A. HOUSTON, OF BELOIT, WISCONSIN.

IMPROVEMENT IN GRAIN-BINDERS.

Specification forming part of Letters Patent No. **187,974**, dated March 6, 1877; application filed November 13, 1876.

To all whom it may concern:

Be it known that I, GEORGE A. HOUSTON, of Beloit, in the county of Rock and State of Wisconsin, have invented a new and useful Improvement in Grain-Binders, which is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a perspective view of the grain-platform and reel of a harvester with my improvements attached; Fig. 2, a horizontal section of the band-making mechanism, taken on the line *x x*, Fig. 4; Fig. 3, a plan view of the parts of the machine shown in Fig. 1; Fig. 4, an end elevation of the same; and Fig. 5, a detail vertical section taken on the line *y y*, Fig. 4.

The object of my invention is to provide mechanism by means of which the grain may be bound upon the machine with a straw band made from straw cut and gathered by the machine as it passes along over the field.

That part of my invention which is herein described and claimed relates only to the apparatus for making the band on the machine as it is drawn along, and while cutting the grain.

The invention consists in a supplemental divider and grain-guard, located just outside of the ordinary divider, so as to make a narrow passage, within which a small quantity of straw may be gathered from which to make a band.

It also consists in a supplementary reel, mounted on the same shaft as an ordinary reel, and caused to revolve between the two dividers, so as to sweep the straw for the band back in the passage above mentioned to the twisting mechanism in the rear.

It also consists in pivoting the supplementary divider, so that it may be vibrated to close the passage of the band-straw whenever desired.

It also consists in the combination of this pivoted supplementary divider with a device by means of which the width of the opening for the band-straw is regulated automatically by the size of the band.

It also consists in connecting the clutch by means of which the twisting mechanism is thrown in and out of gear with the pivoted divider, so that when the operation of the twisting devices is stopped, the opening will be closed and no straw will be gathered for a band.

It also consists in special devices for holding and twisting the band, which will be fully described hereafter.

It also consists in a receptacle arranged at the rear of the grain-platform to hold the surplus band as it is drawn from the twister; and it further consists in various combinations of devices, all as will be hereinafter fully described.

In the drawings, A represents the grain-platform of a harvester, which may be of any ordinary construction. At the outer end of this platform is the usual divider B and a high grain-guard, B′. Just outside of the divider B, and a little distance from it, is a supplementary divider, C, which extends back to the rear of the platform, and is pivoted to the supporting-frame of the latter at *c*. Just above this pivoted dividing-bar C is a supplementary grain-guard, C′, which is also attached to the supporting-frame of the platform. A very narrow passage is thus formed between the divider B C and the grain-guard B′ C′, within which a very thin strip of grain will be received, just outside of the grain cut and delivered upon the platform as the machine is drawn along. The finger-bar *a* and cutter-bar *b* are extended beyond the divider B across this passage, so that the grain-straw entering between the dividers B and C will be severed by the cutter. At the bottom of the passage, just in rear of the cutting apparatus, is placed a trough or receiver, D, which extends backward to the twisting devices, to be hereinafter described.

An ordinary gathering-reel, E, is mounted upon a shaft, *e*, which is supported in the usual manner. A supplementary reel, F, is also mounted on the same shaft, and arranged to revolve in the narrow space between the grain-guards B′ C′. This supplementary reel is composed of arms only, which are somewhat longer than those of an ordinary reel, and have circular recesses at their outer ends, as shown in Fig. 1 of the drawings. By this device the straw which enters the narrow passage is thrown back and laid in the trough or receiver

D, and delivered to the twisting mechanism. A hollow shaft, G, is mounted in suitable standards G′, at the rear outer corner of the platform-frame, and outside of the platform proper. At the forward end of this shaft are two rollers, H, just in rear of the trough or receiver D. Upon one end of the shaft of the rollers H are mounted beveled gear-wheels *h*, arranged on opposite ends of the shafts—that is, so that they will be on opposite sides of the tubular shaft G. A cross-bar, I, is rigidly attached to the shaft G, just in rear of the wheels *h*, in the ends of which are mounted short shafts, carrying upon their forward ends beveled pinions *i*, which mesh with the beveled wheels *h*, and on their rear ends planetary gears *i′*, which mesh with a stationary gear-wheel, J, rigidly attached to one of the standards. On the rear end of the hollow shaft G is a gear-wheel, K, which meshes with a corresponding gear-wheel, K′, underneath it, mounted on a shaft, *k*, which has its bearings in a suitable frame, L, and carries at its other end a beveled pinion, *k′*. A beveled wheel, M, is mounted at the lower end of a vertical shaft, *m*, and meshes with the pinion *k′*. The shaft *m* is also mounted in a frame, L, and carries upon its upper end a roller, N. A corresponding roller, N′, is mounted in a supplementary frame, L^1, which is pivoted to the frame L, so as to be free to swing back and forth. On the upper ends of rollers N N′ are small pinions *n n′*, which mesh together. The swinging piece L^1 is extended to the rear through an opening, *l*, in the frame L, which is large enough to afford a limited play to the piece L^1. The outer end of the piece L^1 carries a stud, *l′*, which passes through a slot in the rear end of the divider C. A screw-thread is cut upon the stud *l′*, and there are adjusting-nuts L^2 thereon, by means of which the rear end of the swinging piece L^1 and the divider C are adjusted nearer to or farther from each other. A sprocket-wheel, *g*, is fastened to the shaft G, and a corresponding sprocket-wheel, O, is mounted upon a shaft, P, on the frame-work of the machine. A sprocket-chain, *o*, passes over these two sprocket-wheels, by means of which the shaft G is driven from the shaft P. The wheel O is loose upon the shaft P, and is provided with a ratchet upon its outer face, with which a pin, *p*, in the shaft P engages. An angular lever, Q, is pivoted to the frame and connected to the wheel O, so that by means of the lever the latter may be slipped back and forth on the shaft P, to engage with and be disengaged from the pin *p*. A rod, R, is attached to the other arm of the lever Q, which extends across the machine, in rear of the platform. The outer end of the rod R fits loosely in a hole in the pivoted divider C, and is provided with an adjusting-nut, and against which the divider rests, so that the movement of the lever Q will not only slide the wheel O upon the shaft P, but will also vibrate the pivoted divider C. A spring, S, is placed between the end piece of the platform and the pivoted divider C, just in front of the pivot, whereby the forward end of the divider is always pressed outward so as to leave the mouth of the narrow passage open, unless some contrary force is exerted to close it. In rear of the grain-platform a receiver, T, is attached to the frame, which holds the surplus band whenever it is made more rapidly than it is used by the binding mechanism.

The operation of my invention is as follows: As the machine is drawn along through the field of grain a small amount of straw will be received in the narrow passage between the dividers B and C, within which it is severed by the cutter and delivered by the supplementary reel upon the trough or receiver D, when the ends will either be caught by or must at first be delivered to the rollers H. The shaft G is rotated, as heretofore described, by connecting the shaft P, in some suitable manner, with the main gearing of the machine. The rollers H are, therefore, carried around with the shaft, and at the same time are caused to revolve inward toward each other by means of the gearing described above. The straw is thus fed in through the tubular shaft G, and out at its rear end to the second set of rollers N N′, which are in a stationary frame. The ends of the straw being grasped by these rollers, it is evident that the portion between the two sets will be twisted by the revolution of the shaft G. Scarcely any twist will be given to the straw before it passes to the rollers H, as, after the feed is once commenced, the wisp of straw in the receiver D will be turned over freely by the movement of the rollers H in unison with the shaft G. The feed-rollers N N′ are driven by the gearing heretofore described, so as to rotate outwardly in the direction indicated by the arrows in Fig. 2 of the drawings, and the band of straw passes between them in a twisted condition, and is delivered into the receptacle T, whence it is led directly to the binding mechanism (not here shown) without the intervention of a reel, as I have found that the twisted band will readily double upon itself in the receiver T as it accumulates, and will be straightened out by the strain upon it when it is pulled forward by the binder. It is evident that by the operation of the spring S, and the connection between the rear end of the divider C and the pivoted piece L^1, the roller N′ is made yielding, and thus any variation in the size of the band will move the piece L^1 upon its pivot, and thereby vibrate the divider C. In this way the opening between the dividers is automatically regulated, so that the amount of straw entering will be about the same, thus securing a substantial uniformity in the size of the band. Also, when the twisting mechanism is thrown out of gear by the lever Q, the divider C will be vibrated by the connecting-rod R, so as to close the opening of the passage to the twister, thereby preventing the accumulation of straw in the receptacle D, while, in passing barren

spots, the twister may be thrown out of operation, so that the straw will not be used up and the feed lost. The accumulation of surplus band in the receptacle T will be sufficient for all these purposes, although the binder may continue to operate all the while. The grain-guards B′ and C′ differ somewhat in construction from those ordinarily used. They must be considerably higher than ordinary guards, their width gradually increasing from their forward ends, so that in crinkled and lodged grain the band-straw may be picked up and completely separated from the rest of the grain before it reaches the cutters; otherwise the proper delivery of the straw to the twisting mechanism would be prevented. It is possible that two small reels will be found more suitable to deliver the straw to the twister; if so, I propose to substitute them for the one reel F. It is also possible that it may be found necessary to place a shield at the rear end of the receptacle D, in such a position as to direct the straw to the feed-rollers H, and prevent it from becoming entangled with the gearing attached to the tubular shaft G.

It is evident that it is not absolutely necessary to construct the narrow passage for the band-straw at the outer end of the platform. In some classes of harvesting-machines the dividers and guards may be located anywhere along the length of the finger-beam, it being necessary only to so construct and arrange these devices as to prevent all interference with the operation of the ordinary mechanism for discharging the grain from the platform.

It is also evident that the special construction and a relative arrangement of many of the devices described may be changed without materially modifying my invention.

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

1. The combination, substantially as described, of devices for separating out a thin strip of the standing grain and conducting it into a narrow passage, a cutter for severing it within said passage, and mechanism for automatically feeding the cut grain to a twisting apparatus adapted to form it automatically into a continuous twisted band.

2. The supplementary divider C, arranged outside of the ordinary grain-divider B, so as to leave an open space between the two, substantially as and for the purpose set forth.

3. The divider B and grain-guard B′, in combination with the supplementary divider C and grain-guard C′, outside of the former, whereby a narrow passage is produced at the outer end of the platform, leading back to the rear of the machine, substantially as and for the purpose set forth.

4. The auxiliary reel F, in combination with the grain-guards B′ C′, between which the reel revolves, substantially as and for the purpose set forth.

5. The grain-guards B′ C′, in combination with the receptacle D, arranged between the guards and below the reel F, substantially as and for the purpose set forth.

6. The tubular shaft G, in combination with the feed-rollers H, mounted on the forward end of the shaft, just in rear of the receptacle D, and driven positively about their own axes, substantially as described.

7. The tubular shaft G, in combination with the feed-rollers H, mounted on its forward end and turning therewith, and the stationary feed-rollers N N′, substantially as and for the purpose set forth.

8. The pivoted divider C, in combination with the yielding support of one of the feed-rollers N′, with which it is connected, whereby the opening between the dividers B C is regulated by the size of the band, substantially as described.

9. The combination of the pivoted divider C, spring S, hinged frame L^1, having a feed-roller, N′, mounted therein, and connected at its free end to the rear end of the divider C, substantially as and for the purpose set forth.

10. The pivoted divider C, in combination with the clutch-lever for throwing the twisting mechanism into and out of operation, connected to the said divider, whereby the latter is vibrated to close the opening between the two dividers when the twister is thrown out of operation, substantially as described.

11. The tubular twisting-shaft G, in combination with the feed-rollers N N′ and band-receptacle T, all arranged as described, and for the purpose set forth.

12. In a harvesting-machine, a narrow passage obtained by two grain dividers and guards, projecting in front of the cutting apparatus, and extending in rear thereof, in combination with a receiver and a twisting mechanism, whereby a thin strip of standing grain is conducted into the passage, severed therein, automatically fed to the twisting mechanism, and made into a continuous twisted band as the machine is drawn along over the field.

GEORGE A. HOUSTON.

Witnesses:
L. A. BUNTING,
L. M. HARRIS.