

[54] **BINDING MACHINE**

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[58] **Field of Search**.....**11/1 A, 1 AC; 281/25**

[56] **References Cited**

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[57] **ABSTRACT**

Semi-automatic machine for attaching to perforated bundles of leaves a continuous metallic binding comprising a succession of originally open rings. The machine comprises a reel for delivering the binding, and a chain along which the binding is advanced from a cutting station to a pressing station at which the rings are closed through the perforations in the bundle.

6 Claims, 4 Drawing Figures

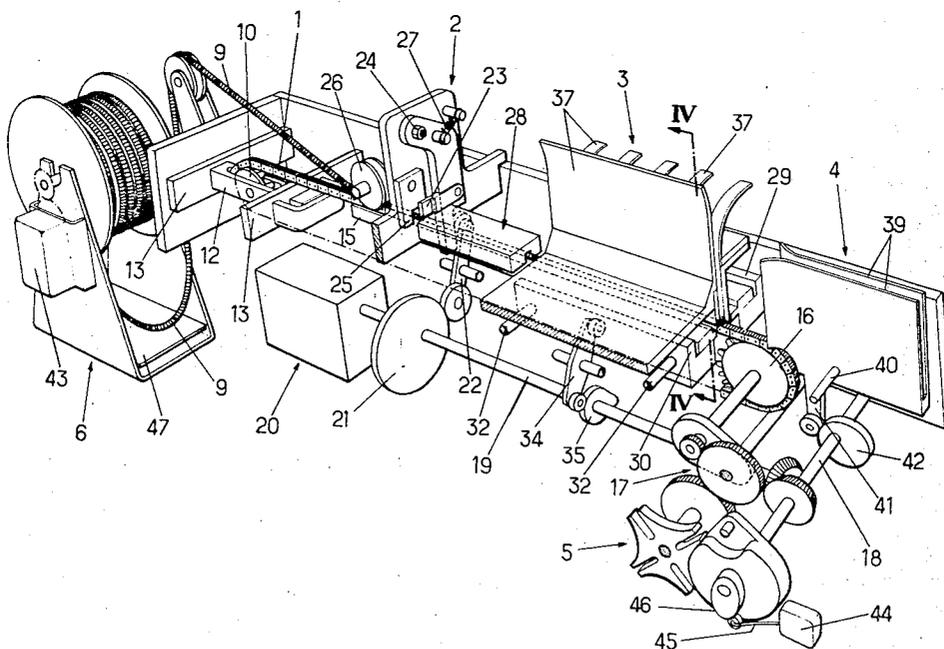


FIG. 1

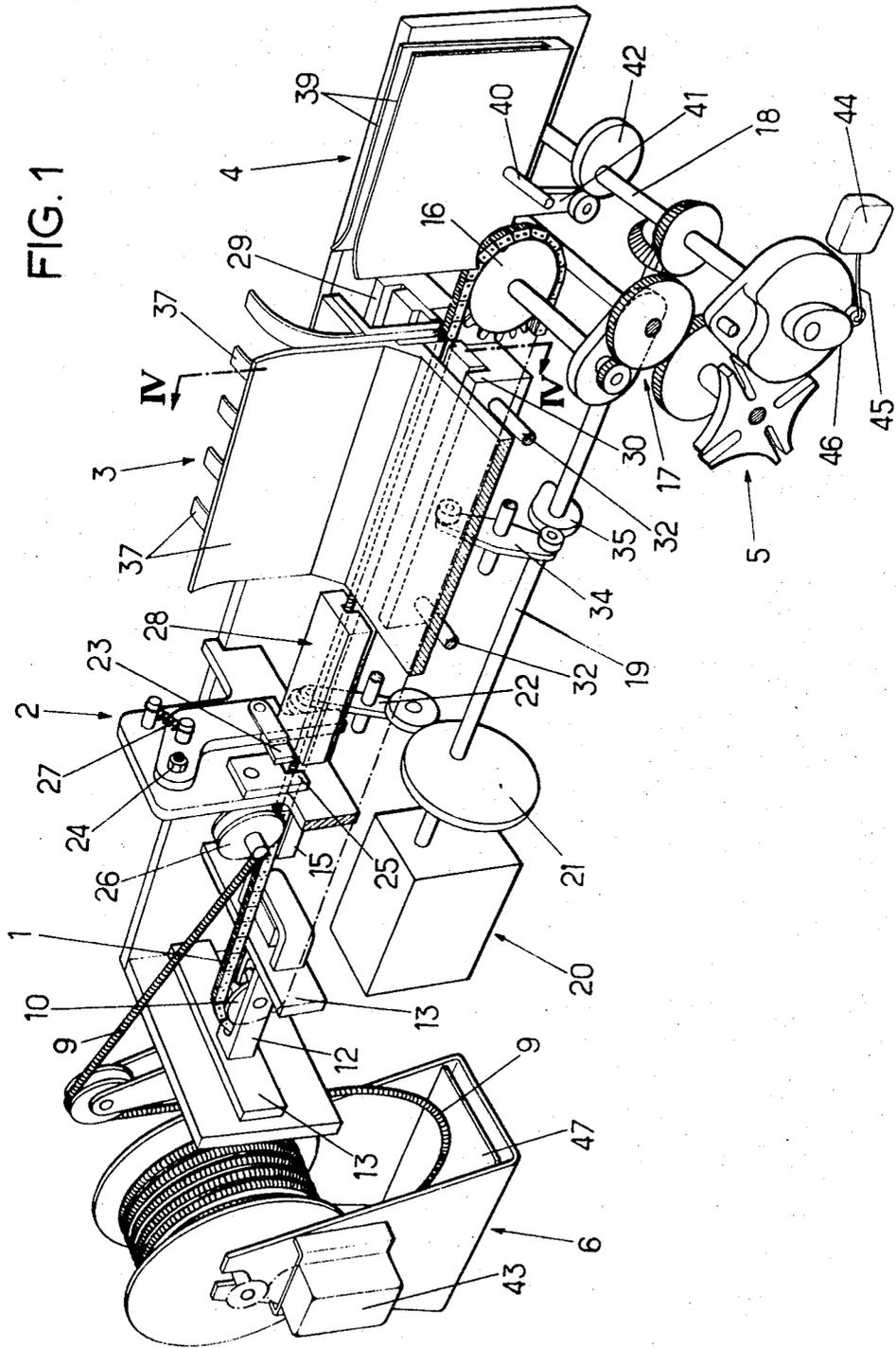


FIG. 2

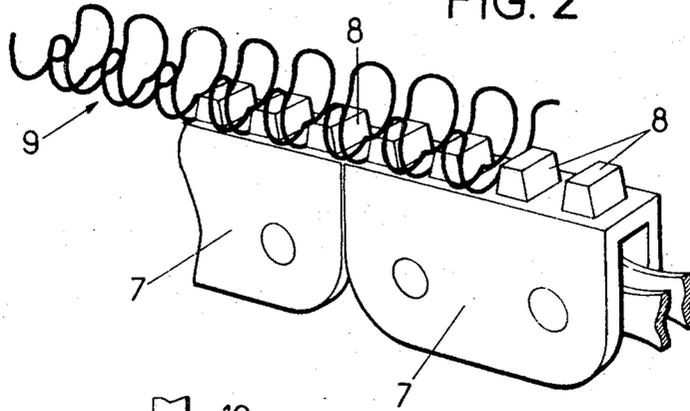


FIG. 3

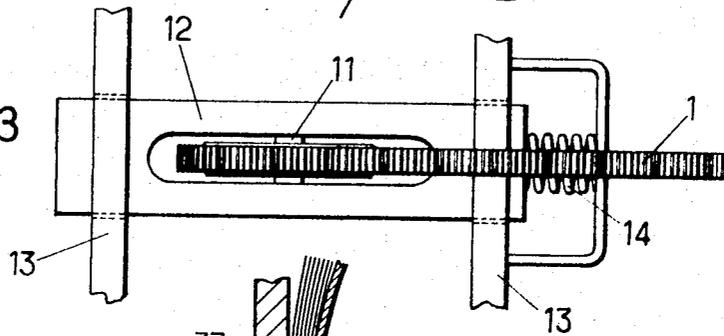
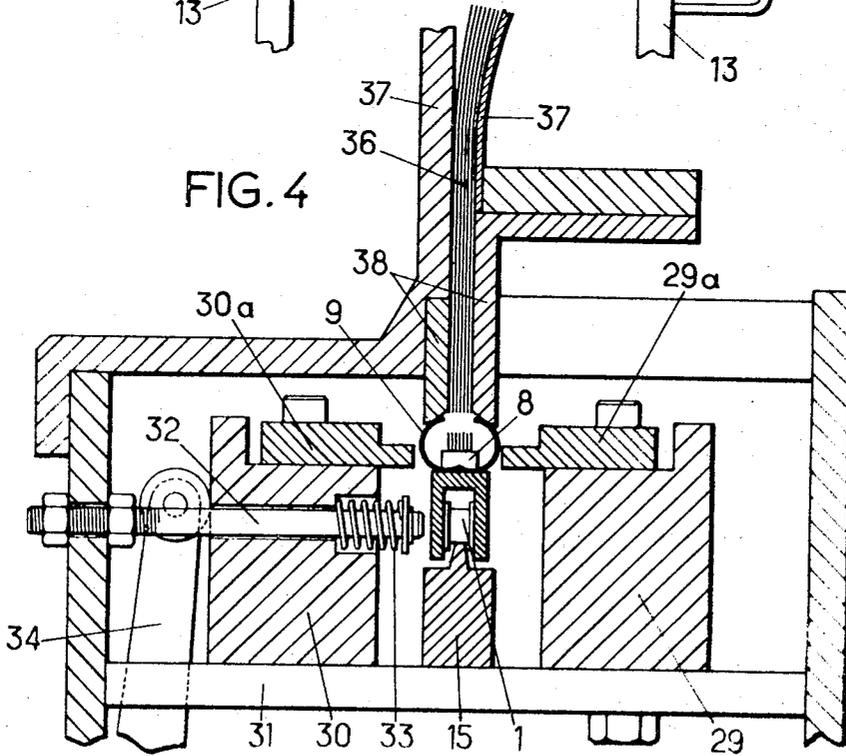


FIG. 4



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BINDING MACHINE

SUMMARY OF THE INVENTION

This invention relates to a machine adapted to semi-automatically bind perforated bundles using binders supplied from reels. These binders are continuous metallic binders forming a regular succession of open rings adapted to be closed through the perforations of the bundle to be bound.

There is a known system of utilizing such precut binders for binding perforated bundles which involves the use of a press into which both the precut binders and the bundle to be bound are introduced by hand. This succession of operations is slow and, on the other hand, it is difficult to position the binder properly.

There is another known method which utilizes a machine in which the binder is cut off and lead transversely between the jaws of the press. With such a machine the positioning of the binder is not accurately insured. It then often happens that certain rings of the binder do not penetrate the corresponding perforations in the bundle so that it must be discarded. Finally, the hourly output is low.

The binding machine according to the invention makes it possible to eliminate these disadvantages. As the binder leaves the coil it is guided the length of the machine so that it is very accurately positioned. It is cut, and then introduced longitudinally between the jaws of the press while still guided. The speed of operation is high so that there is a large hourly output but there are very few rejects. The machine according to the invention comprises an endless chain having two laps which engages the metallic binder. The latter is thus lead along by the chain to a cutting device which cuts it to the desired length, and then between the jaws of the press which closes the binder on a bundle which is introduced manually into the press.

The chain is intermittently actuated by a movement such that it advances for a distance equal to the length of the bundle to be bound, and then stops for a period which is longer than that during which it advanced and while it is stopped the cutting device and binding press are actuated.

A guide may be provided between the cutting device and the press, which guide covers the binder which has been cut off and is being advanced by the chain. The distance between the point at which the binder is cut and the beginning of the press is then equal to the exact length of the bundle to be bound.

It is also possible to provide at the end of the path of travel of the chain a device for ejecting the bound bundles. This device consists of a mobile guide into which the bound bundle is lead at the end of its path of travel. The ejector assembly then swings, thus releasing the connection of the bundle to the chain and causing the bound bundle to fall.

Moreover, electro-mechanical means may be provided for driving the reel at the beginning of the machine on which the binder is wound. This device controls the unwinding from the start of the advance of the chain and its automatic stopping when the binder has enough slack.

It is also possible, with the machine according to the invention, to bind bundles of different sizes. In order to permit the change in size it suffices to alter the speed of the chain and move the cutting device relative to the press. This may be adapted to handle several shapes and sizes, or be provided with interchangeable jaws.

A preferred embodiment of the invention is illustrated, purely by way of example, in the accompanying drawings, in which:

FIG. 1 is an exploded perspective view of the machine as a whole;

FIG. 2 is a perspective view showing the lengths of the chain and the metallic binding;

FIG. 3 is a detailed plan view showing the tension spring of the chain; and

FIG. 4 is a sectional view taken along the line IV—IV of FIG. 1, showing the press.

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As shown in FIGS. 1 and 4, the machine comprises a chain 1, cutting device 2, a press 3, an ejector 4, a maltese cross driving gear 5, and means 6 for unwinding the binding.

It will be seen on FIG. 2 in particular that the chain comprises links 7 provided with teeth 8 between which the coils of the open binder 9 engage. The chain 1 is mounted at one end on an idler 10. The shaft 11 of the idler 10 is mounted in a fork 12 which is slidable in orifices provided in the supporting bar 13 fixed to the framework of the machine. The fork 12 is, on the other hand, biased by the spring 14 shown in FIG. 3 so as to insure constant tension on the chain 1. The upper lap of the chain 1 is kept perfectly horizontal by means of a support 15 on which the links of the chain 1 slide. The chain is driven by a drive wheel 16 driven by a gear train 17 the components of which are interchangeable when it is desired to modify the size of the binding.

The gear train is controlled by a maltese cross device 5 which is driven by the shaft 18 which engages the shaft 19 driven by the motor 20.

The cam 21 fixed to the shaft 19 actuates the lever 22, thus swinging the knife 23 about its shaft 24. The combined action of the knife 23 and the counter blade 25 cuts the binder 9 which is advanced by the roller 26 to engage the chain 1. After the binding has been cut off, the knife 23 is withdrawn to its original position by the spring 27. The binding, which has been cut to the desired length and is engaged by the chain 21, first enters the guide 28 and then the press 3.

This press 3, shown on FIG. 4, comprises a fixed member 29 and a movable member 30 surmounted by jaws 29a and 30a. The movable member 30 is slidable upon supporting bars 31 fixed to the framework of the machine and is guided by shafts 32 and retracted to its original position by springs 33. The member 30 is actuated by a lever 34 and a cam 35 fixed to the shaft 19 shown on FIG. 1. The bundle 36, which has previously been perforated, is introduced into the press 3 held by the guides 37 and positioned with respect to the binder by means of a lateral stop not shown on the drawings and positioned between the guides 37 at the entrance to the press. The bundle rests mainly on the teeth 8 of the chain 1. The open binder 9, supported by the projections 38 of the guides 37 and the jaws 29a and 30a, is crushed between the flat parts of these jaws, and the rings of the binder 9 are introduced into the perforations in the bundle 36.

After having been bound, the bundle, still driven by the chain 1, enters the ejector 4. It is lead by the chain 1 between two plates 39 connected to each other at their lower ends. These two plates 39 are swingable about the shaft 40, and swing when actuated by the lever 41 and the cam 42 fixed to the shaft 18. At the end of this movement the bound bundle is ejected by sliding down between the two plates 39, which return to their original position ready to receive a new bound bundle.

The supply reel holding the binder 9 is driven by reduction gearing 43 started electrically by a switch 44. This switch is controlled by a small lever 45 actuated by the cam 46 so that the binding 9 begins to unwind a little before the chain 1 begins to advance. The binding 9 is stopped from unwinding either by means of the switch 44 actuated by the cam 46, or when the binding 9 enters into contact with a conductive plate 47 beneath the supply reel carrying the binding 9. This insures the proper slackness of the binding 9 at the entrance to the machine.

In order to bind bundles of different sizes and shapes it suffices to replace the gear train 17 so that the speed at which the chain is advanced may be modified, and to slide the cutting device 2, its lever 22 and its cam 21 so as to change the distance between the cutting point and the entrance to the press. This distance must always be equal to the length of a bundle.

The press 3 is so constructed as to be able to bind the largest bundle possible and may then also serve to bind a small bundle. The jaws 29a and 30a may also be replaced in order to adapt the press to different sizes of bundles.

The machine according to the invention may be utilized in the paper industry for continuously binding bundles of different sizes by means of metallic binders wound up on reels, said operation being carried out with few rejects and a high hourly output.

What is claimed is:

1. Semi-automatic binding machine for attaching to a perforated bundle a metallic binding initially comprising a succession of originally open rings adapted to be closed through the perforations of said bundle, said machine comprising in combination an endless chain intermittently driven so that it advances step by step a distance equal to the length of the bundle at each step, said chain comprising teeth which engage the side of the binding remote from the openings in the rings thereof, cutting means along the path of said chain for cutting the binding when the chain is stopped to the length of the bundle to be bound, and a press along the path of said chain and spaced from said cutting means for closing the rings of a cut-off section of said binding through the perforations of said bundle when the chain is stopped.

2. Binding machine as claimed in claim 1 in which the cutting device and the press are actuated by cams and levers fixed to a continuously rotating drive shaft which shaft also drives the chain intermittently through a gear train comprising

a maltese cross gear.

3. Binding machine as claimed in claim 1 which comprises a guide mounted over the path of travel of the chain between the cutting device and the press and in which the interval separating the cutting device and the entrance to the press is equal to the length of the bundle to be bound.

4. Machine as claimed in claim 2 comprising an ejection device at one end of the path of travel of said chain, said ejection device comprising two plates connected together at their lower edges and mounted to swing as a unit about a common axis, and a cam actuated by said drive shaft for swinging said plates.

5. Machine as claimed in claim 1 comprising a supply reel carrying said binding and from which said binding is lead to said chain, a motor for driving said reel, a switch for starting said motor and means responsive to excessive slack in said binding for stopping said motor.

6. Machine as claimed in claim 1 comprising a supporting frame, and a slideway on said frame on which said cutting means is mounted for sliding movement toward and away from said press, and means for regulating the speed of said chain.

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