Common Binder Head and Knotter Head Troubles
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COMMON BINDER HEAD AND KNOTTER HEAD TROUBLES

By H. H. MUSSELMAN and A. J. BELL

BINDER HEAD TROUBLES

When it is time to harvest small grains, speed and good work are necessary if the farmer is to save all of the crop at the lowest possible cost. Binders must be fully efficient to handle the cutting and binding with few stops and missed bundles. The operator must know how to adjust his binder to obtain the best results and complete the harvest most economically.

The trouble chart accompanying this brief discussion of binder troubles is arranged to simplify the diagnosis and the correction of troubles encountered in the operation of the binder. The following paragraphs contain information which is mentioned in the chart and which cannot conveniently be included in the chart.

Section 1.

BUNDLES TOO LARGE OR TOO SMALL

The bundle is formed in the space between the packers and the compressor arm. Obviously, the greater the space the larger the bundle, and the smaller the space the smaller the bundle. The size of the bundle may be made smaller by moving the compressor arm nearer the packers and larger by moving it farther away from the packers.

Some binders (Massey-Harris, Osborne, and Deere tractor binders) carry also a horizontal trip arm. Setting this arm higher makes a smaller bundle, and setting it lower makes a larger bundle.

Section 2.

BUNDLES TOO TIGHT OR TOO LOOSE

In most machines, the compressor arm acts also as a trip arm. This trip arm is connected with the stop arm through a shaft which is held in place by a trip spring. The pressure of the bundle against the trip arm eventually exerts enough pressure to overcome the pressure of the trip spring, and the stop arm is raised, thus releasing the dog, which now engages with the dog driver. The bundle is then tied and discharged. The tighter the tension of the trip spring the tighter the bundle.

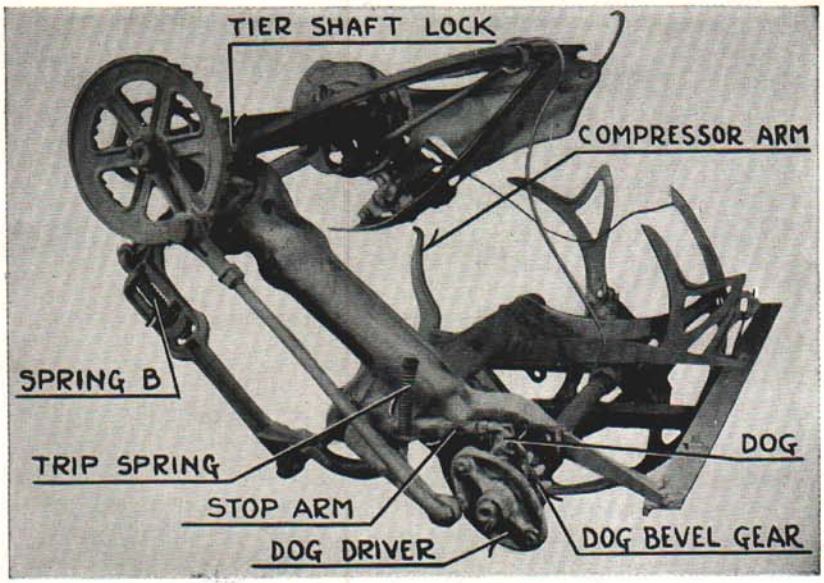

Fig. 1. Deering or I. H. C. Model D Binder Head.

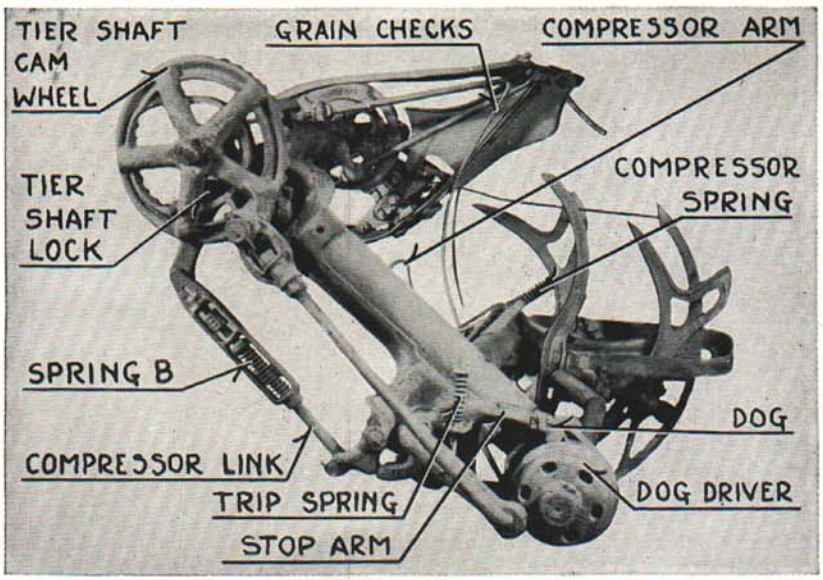

Fig. 2. Deere Binder Head.

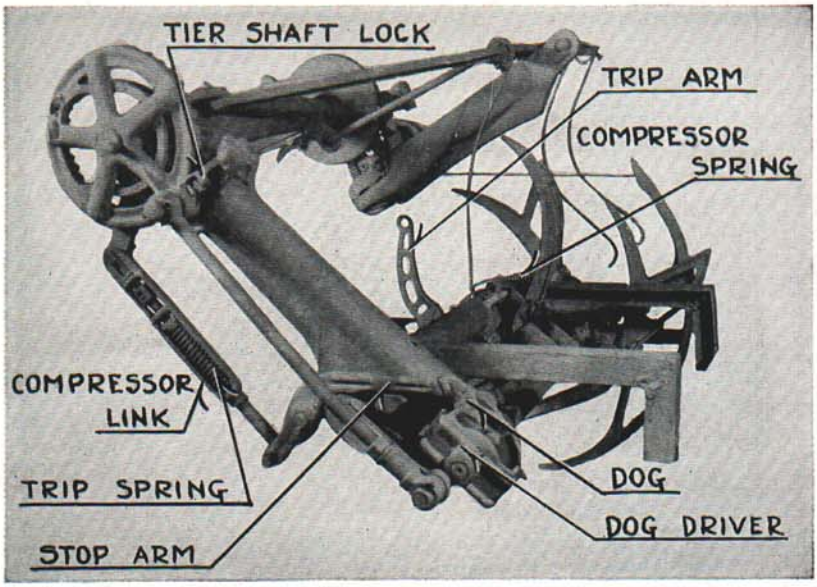

Fig. 3. McCormick or I. H. C. Model M Binder Head.

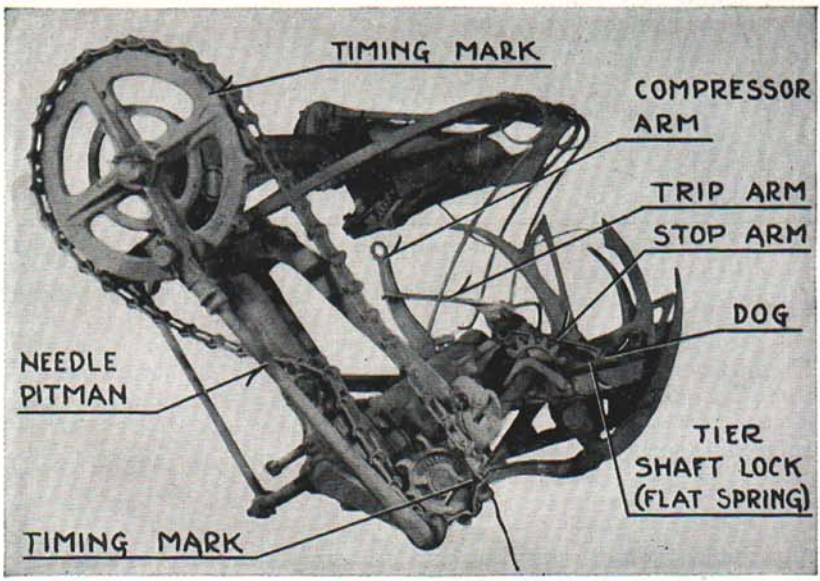

Fig. 4. Massey-Harris Binder Head.

Section 3.

DISCHARGE ARMS DO NOT START, OR REVOLVE PART WAY AND STOP

When the pressure of the bundle raises the stop arm, the action of the dog spring forces the dog to move forward and engage the dog driver. If the spring becomes weak, lost, or broken the dog and dog driver become disengaged and the discharge arms fail to cast the bundle. Temporary relief may be obtained by stretching a weak spring.

Section 4.

DISCHARGE ARMS REVOLVE WITH A JERKY MOTION

If the striking faces between the dog and dog driver become badly worn, they may slip past each other at times of excessive pressure. They may catch again and go part way before slipping again. This causes a stopping and starting of the discharge arms.

Section 5.

DISCHARGE ARMS REVOLVE CONTINUOUSLY

The dog is badly out of time with the stop arm, Fig. 5. On McCormick, Deering, Deere, and Osborne heads, remove dog driver and move discharge arms around until they are in the position of rest. Slip the bevel gear, which carries the dog, out of mesh with the bevel gear which it drives. Hold the dog back, fully compressed against its spring; then move the dog bevel gear around until the face of the dog touches the face of the stop arm. Push the dog bevel gear into mesh with its mate and replace dog driver. Adjust stop arm until you have one-eighth inch clearance between the dog and stop arm.

Fig. 5. Timing the Dog.

On the Massey-Harris head, remove sprocket chain which drives tier shaft. Set discharge arms in a position of rest. Turn small sprocket until stop arm has forced the dog back and tier shaft lock has dropped into place. Replace sprocket chain with 14 links between the arrow cast on the tier shaft sprocket and the timing mark cast on small sprocket.

Section 6.

A SMALL BUNDLE IN GOOD STANDING GRAIN

When the striking faces between the stop arm and the dog become worn bevel-shaped, they will occasionally slip by each other and make another series of revolutions.

KNOTTER HEAD TROUBLES

When starting to locate causes of tying troubles, first examine the twine box to see if the twine is unwinding properly; then follow it through the roller tension, twine guides, needles, and disk and watch for conditions that might produce slack or too much tension. It is well to remember that uneven, wet, weak, dried out, or poor twine will cause missed bundles. Missed bundles may also be due to the condition of the straw. In heavy, tangled, tough straw, the needle may carry straws into the disk and prevent the twine from entering the notch in the twine disk. Troubles with the knotter head need not worry the operator long, as they may be traced and located easily. Most operators consider the knotter head as being very complicated but it is very simple. Each working part has a definite function to perform at a definite time. When these operations are understood, knotter head troubles can be quickly traced and overcome.

Section 7.

THE TYING PROCESS IS DIVIDED INTO FIVE STEPS

Step. 1. In the first step, one end of the band (called the disk end) is held in the twine disk, extends back over the bills, then down through the breast plate, and under the bundle to the eye of the needle.

Fig. 6. Step 1 in the Tying Process.

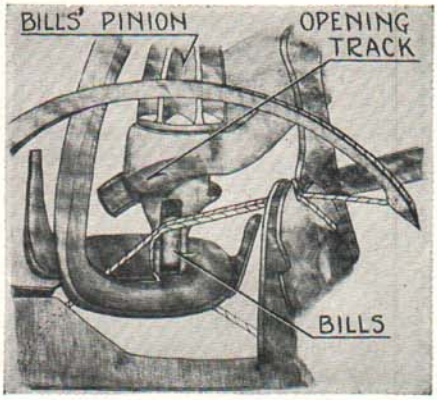

Fig. 7. Step 2 in the Tying Process.

Step 2. When the bundle is ready to be tied, the binder head is tripped. The needle pitman brings the needle up and lays the needle end of the band in the same notch of the disk that holds the disk end of the band. The disk now turns slightly to catch the needle end of the band. The two ends of the band extend from the disk across the bills and around the bundle.

Step. 3. The bills now turn, the upper bill opening to grasp both ends of the band. The band is now looped about the bills, the ends being held fast between the bills.

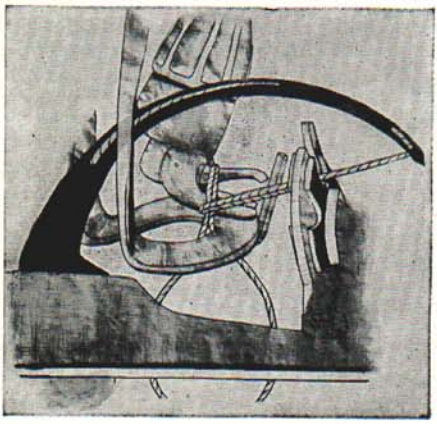

Fig. 8. Step 3 in the Tying Process.

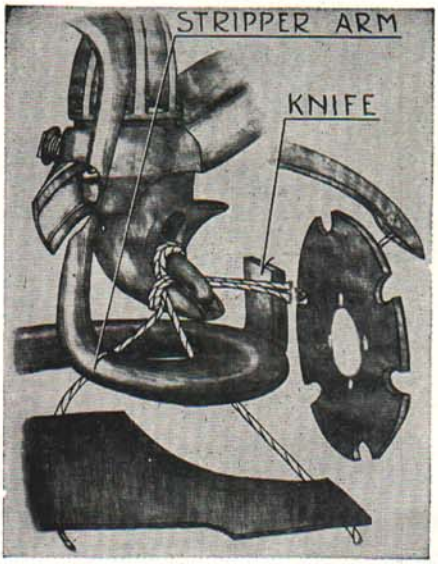

Fig. 9. Step 4 in the Tying Process.

Step 4. The knife now moves forward and cuts both ends of the twine. Usually the knife is mounted on the stripper arm.

Step. 5. As the stripper arm advances, it pulls the loop off the bills. The bills hold on to the ends of the band, thus pulling these ends through the loop completing the knot. The needle now recedes and lays the twine in the next notch of the disk and across the bills ready for the next bundle.

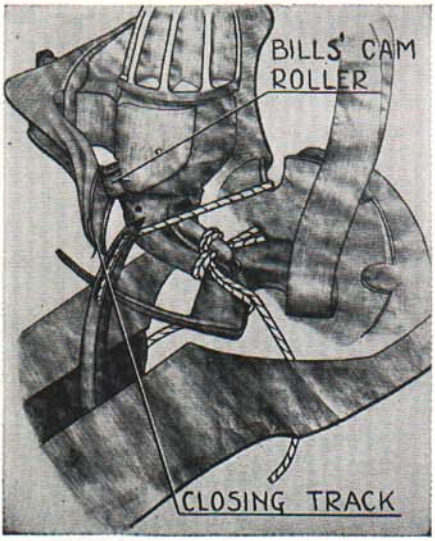

Fig. 10. Step 5 in the Tying Process.

Section 8.

In some heads, the bills are set in such a position that the bands are stripped when the discharge arms cast the bundle. Such heads are not equipped with a movable stripper arm, but instead have stripping tracks which guide the band in the proper direction for stripping.

Section 9.

As the twine leaves the twine can, it passes through the twine tension, eyes, needle, and across the bills to the twine disk. It is the duty of the twine tension to keep the twine straight and to prevent slack from forming in the line. Keep the twine tension tight enough to prevent slack forming any place between the twine tension and the twine disk, and yet loose enough to permit the twine to pass freely through the tension. This tension may be tested by tying a loop in the twine as it leaves the needle and inserting the hook of a spring scale. Pull on the scale until the twine pulls through the tension. The scales should register about six pounds. The scales may also be used to test the tension on the twine disk, bills, and trip arm. The scales should show a pull of 35 to 40 pounds on the twine disk; 12 pounds on the bills; and 22 to 24 pounds on the trip arm. These tests can all be made before the machine goes to the field. Be sure no rust has been allowed to accumulate to affect the test.

Section 10.

SIMPLE KNOT AROUND BILLS—OTHER END CUT

If the twine tension is somewhat tight, the disk tension is loose or even in good adjustment, when the needle advances it is easier to pull the twine from the disk than it is from the can. The needle will place

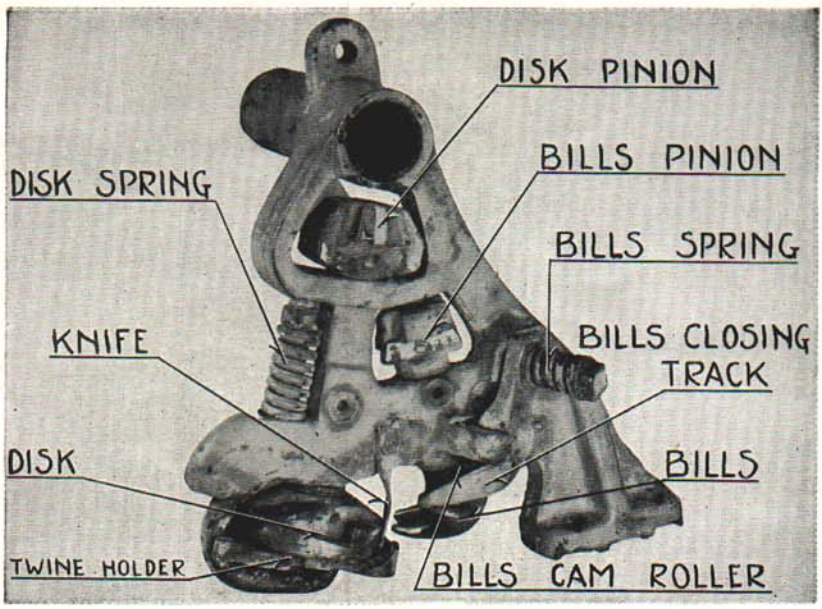

Fig. 11. McCormick or I. H. C. Model M Knotter Head.

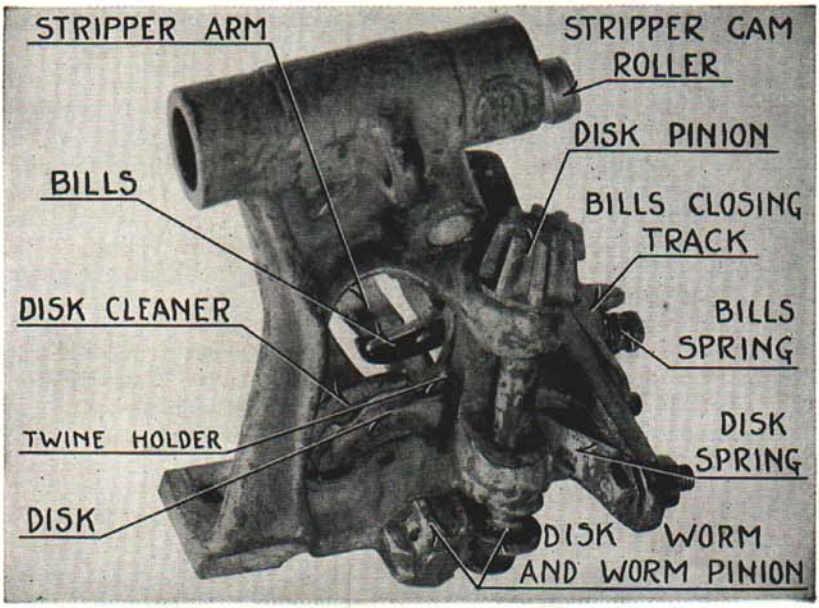

Fig. 12. Deering or I. H. C. Model D Knotter Head.

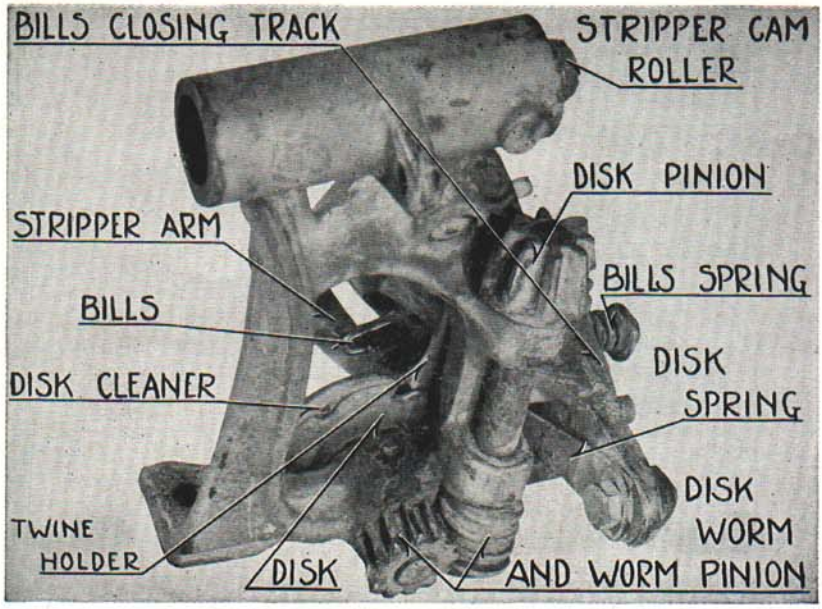

Fig. 13. Deere Knotter Head.

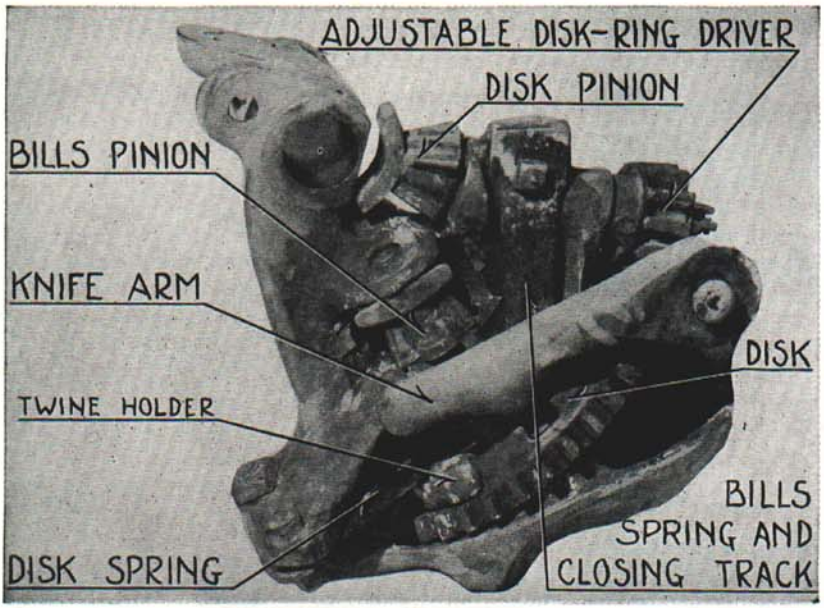

Fig. 14. Massey-Harris Knotter Head.

the needle end of the twine in the notch of the disk. By this time, the disk end of the twine is pulled away from the disk and bills. When the bills revolve, they grasp one end of the twine and make a simple knot. As the other end of the twine is loose, the bundle is cast leaving the band hanging on the bills. Loosen the twine tension before adjusting the disk.

Section 11.

SIMPLE KNOT ONE END—OTHER END CUT—FOUND ON BUNDLE

With this band everything goes all right until the bills start to revolve. They must get some twine to make the knot. If the disk is too loose, the disk end of the twine is pulled out. However, it cannot fall away from the bills as it is held there by the needle end, which is still attached to the needle. The bills then get hold of the needle end of the twine only, and tie a slip knot. As both ends of the twine are held the stripper strips the knot from the bills and it is cast with the bundle. The bundle either spreads as it is cast, or the knot slips when the shocker picks it up.

Section 11a.

If the cam roller on the upper bill is worn, the bills will not open far enough to grasp both ends of the twine. The upper bill is forced between the two ends and a slip knot results.

Section 11b.

Excessive wear under the bills' pinion lets the bills drop down lower than their normal position. When the upper bill opens and revolves, it is forced between the two ends of the twine and ties a slip knot.

Section 11c.

When the disk is out of time from natural wear or by being assembled wrong, the needle end of the twine is not placed in the same notch as the disk end. The two ends are held apart so the bills catch one end and tie a slip knot around the other end.

If the disk being out of time is caused by wear, advance it by the timing adjustment if the head has one. If the disk is plunger driven, the plunger is usually adjustable in length of stroke. If the disk is driven by a gear pinion, which is held on to the shaft with a nut, it may be possible to set it ahead slightly. If no adjustment is provided, it is necessary to replace with new parts.

Section 12.

SIMPLE KNOT ONE END—OTHER END BROKEN—FOUND ON BILLS

Same as in Section 10 except that in this band the disk is so tight that the band cannot slip out of the disk as the needle advances. The band breaks at the disk because it has been weakened there by being pinched by the disks.

Section 13.

SIMPLE KNOT ONE END—OTHER END BROKEN—
FOUND WITH BUNDLE

Everything goes all right with this band until the bills start to revolve. They must get twine from some place. If the disk is too tight the band breaks instead of giving a little twine. The broken end is held on the bills. The bills then tie a slip knot and the band is cast with the bundle.

Section 14.

BOTH ENDS BROKEN—FOUND WITH BUNDLE

With the band, the disk is adjusted so tightly that the bill cannot get any twine when they revolve and both ends are broken. As there is nothing holding the band, it is cast with the bundle.

Section 15.

NO BAND—END OF TWINE CUT

If the twine tension is so tight the needle cannot obtain twine from the twine can, as it starts to recede it pulls the disk end from the disk. The end of the twine may be so short it cannot be rethreaded, or it may be long enough to rethread on the next bundle and the second bundle will be tied perfectly.

Section 15a.

END OF TWINE BROKEN

Same as above except both the disk and twine tensions are too tight and the twine breaks at the disk instead of being pulled out.

Section 15b.

Grooves worn in the twine eyes after several years' use may catch enlarged spots in the twine and cause the twine to break.

Section 16.

BOTH ENDS KRINKLED BY BILLS—NO KNOT—
FOUND ON BUNDLE

With this band, both ends show signs of having been grasped by the bills. However, something has prevented the bills from retaining the band until the knot has been completed. This may be straw or weeds under upper bill, bills' spring too loose, hump on upper bill worn away, or cam roller or closing track badly worn. It may also be caused by the knife arm being bent in such a way the twine is cut too close to the knot. This allows the knot to pull out when the bundle is cast.

Section 17.

FOUND ON BILLS—PERFECT KNOT—BAND BROKEN
ELSEWHERE

This band is caused by something that prevents the band from being stripped from the bills. When the discharge arms cast the bundle, the band breaks in the weakest place.

Section 18.

Straw or green stuff in the disk may prevent the needle from laying the needle end of the twine in the notch of the disk. This causes one end of the twine to be held higher than the other end. When the bills revolve, they tie a slip knot and the needle takes the needle end back with it when it recedes. There will be a slip knot on cast bundle with the twine extending to needle. If the disk is not threaded at this point, the needle may thread the disk on the next time over. The next bundle will be cast unbound, but the third one may be tied perfectly. This band may occur if the twine tension is so loose it allows the twine to hump up over the bills and disk, or if the disk is out of time so that the needle end of the twine is placed higher than the disk end. See Section 11c.

Section 19.

EYE OF NEEDLE NOT THREADED

This is usually caused by the twine tension being so loose it allows a loop to form between the back of the needle and the eye. When the needle advances, the loop is caught in the twine disk and as the needle recedes, the twine will extend from the side of the needle to the disk. If the loop is caught by the bills as well as in the disk, a perfect band may be tied around the bundle, but the eye of the needle will not be threaded.

Material in this bulletin adapted from Bulletin No. 87, "Common Binder Head and Knotter Head Troubles," by C. O. Reed, and R. D. Barden, Ohio State University, and from manufacturers' instruction books.