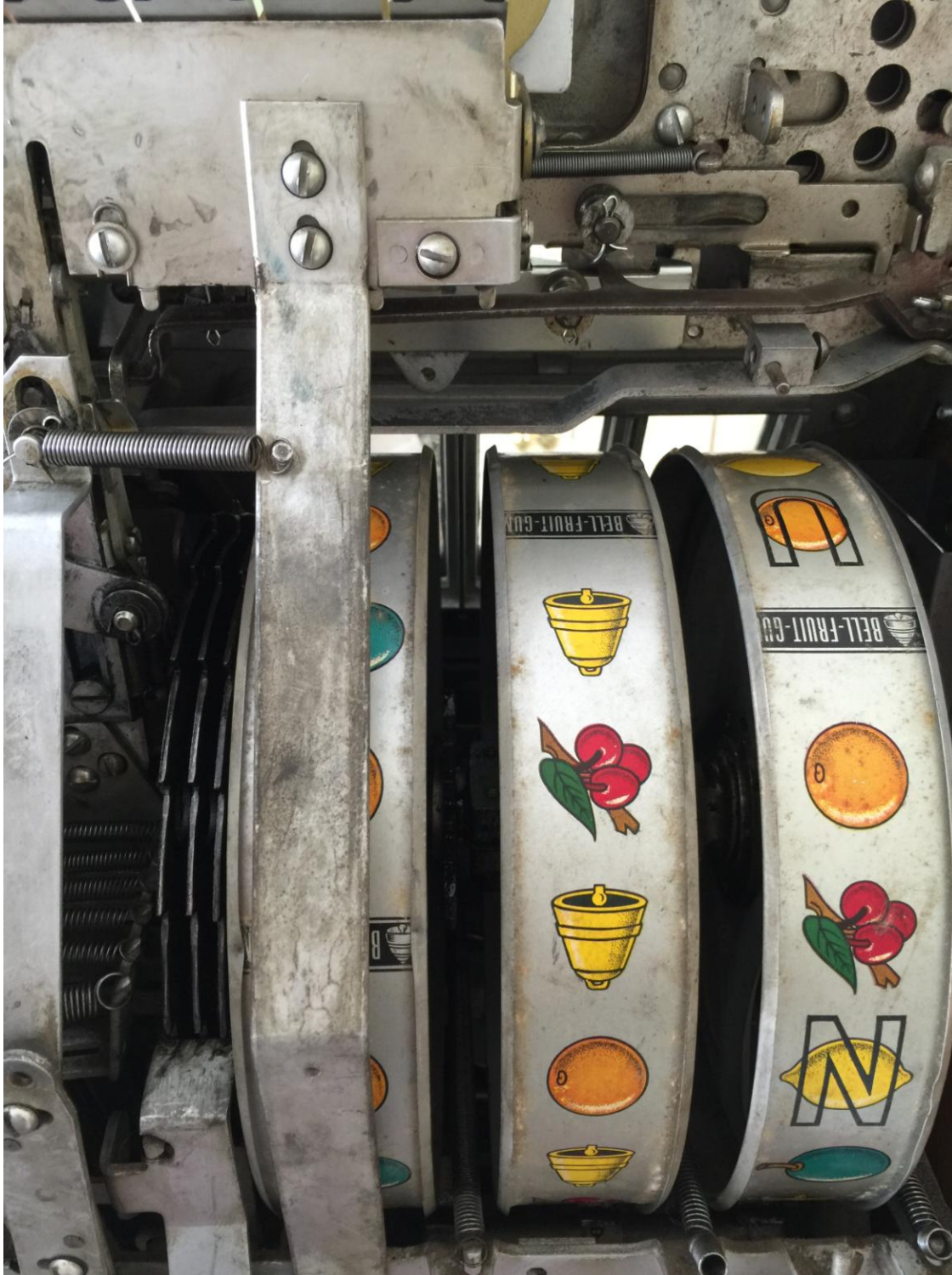




Mills Horse BONUS slot machine, 25-cent denomination.



Close-up view of front of machine. Unless you are quite sure of your skills in restoration, DO NOT attempt to clean or polish the exterior of the slot machine. Simply leave it alone.



Support bracket attached to annunciator (2 screws) and to a bracket above the main operating fork (2 screws, not shown). It is then attached to the timing lever with a spring.



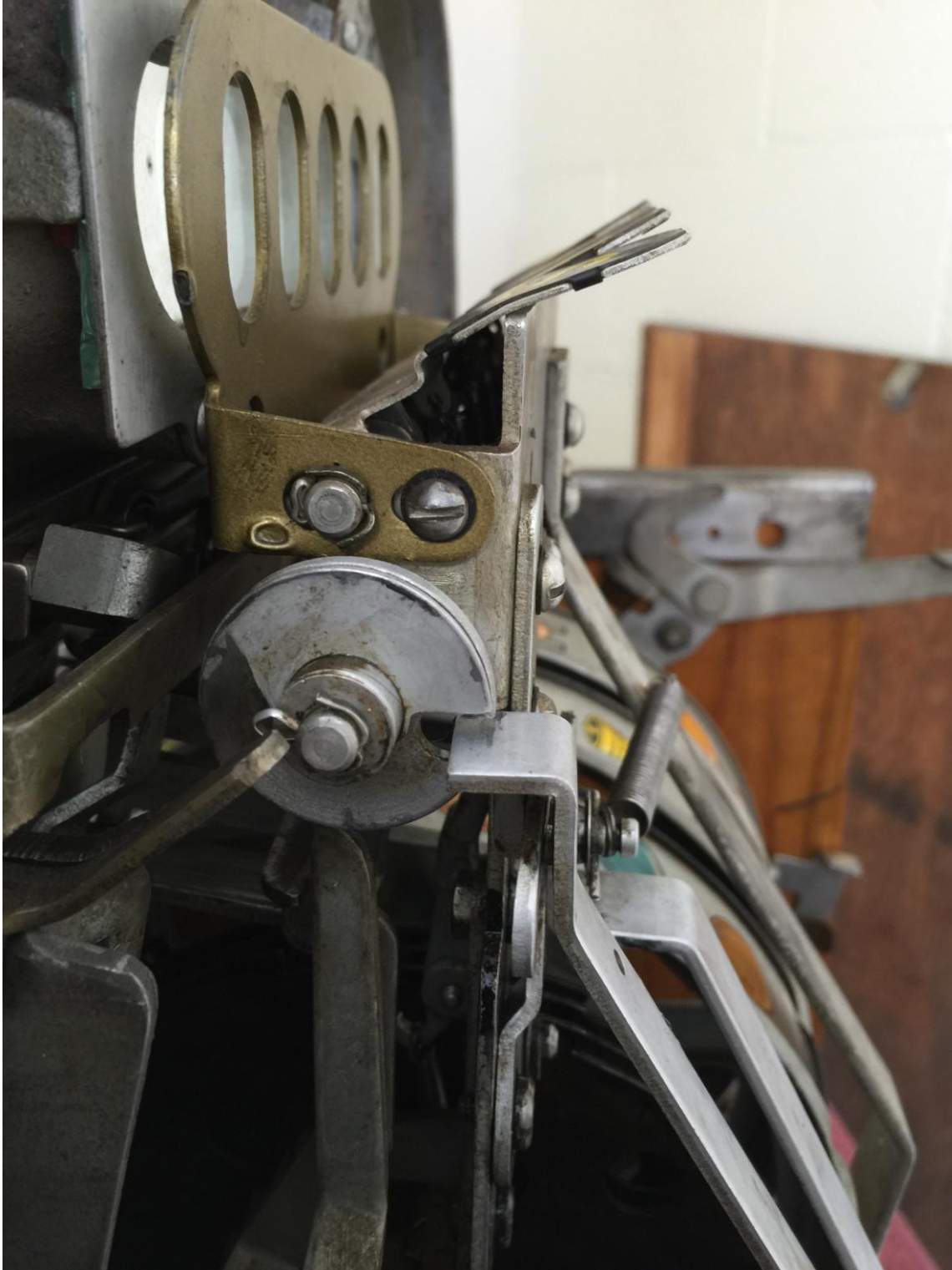
5-sided cusp with roller bearing (in "B" position not shown) - the roller bearing will travel in a **CCW** (counter-clockwise) rotation. The next stop for it will be the "O" position. **DO NOT** loosen or adjust the setscrew! Degrease this region lightly with degreaser. **DO NOT USE** water displacement sprays.



Timing lever attached with 4 screws. There is space to move the lever sideways by loosening all 4 screws and shifting the lever... if you know what you are doing... DO NOT TOUCH it otherwise.



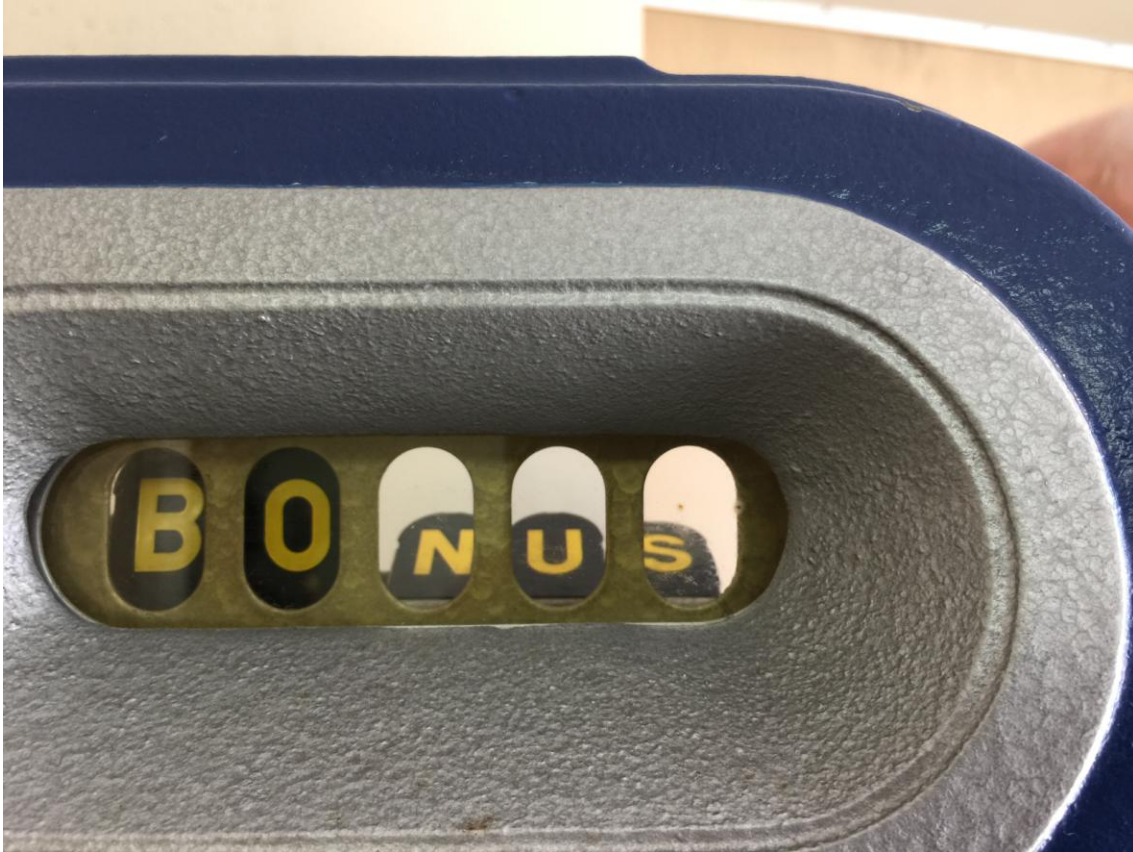
Spring attached from support bracket to timing lever. Oil this spring lightly to prevent rust.



Two cams shown with the bonus sensing lever passing through them: the inner bonus cam and outer bonus cam DO NOT TRAVEL TOGETHER. Degrease and lightly oil so they spin independently of each other. The bonus sensing lever acts as a payout lever after the "S" is activated... 18 coins will fall as a result.



Another view of the two cams (inner and outer) with the bonus sensing lever passing through them. Here, the inner cam is "dragging" its metal corner on the sensing lever - notice the small, dark scrape at the top of the lever under the cams. Both cams must be even with each other. As indicated above, degrease and lightly oil both cams to turn freely.



The display window of the annunciator is showing the "B" and the "O". The remaining three letters are laying down awaiting activation. During the machine operation, the number one reel must show the "N", next to trigger the display flag "N". Any other letter will not activate the display.



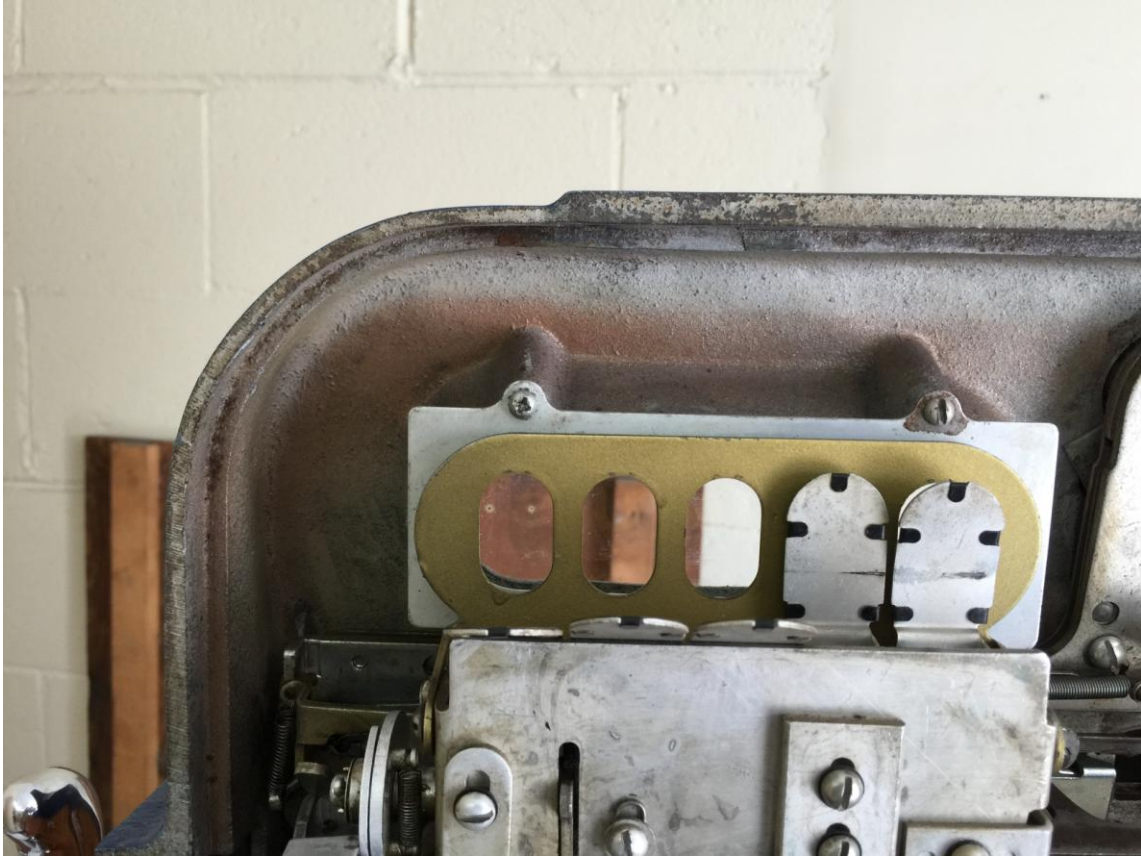
Close-up view of window showing the letters "B" and "O".



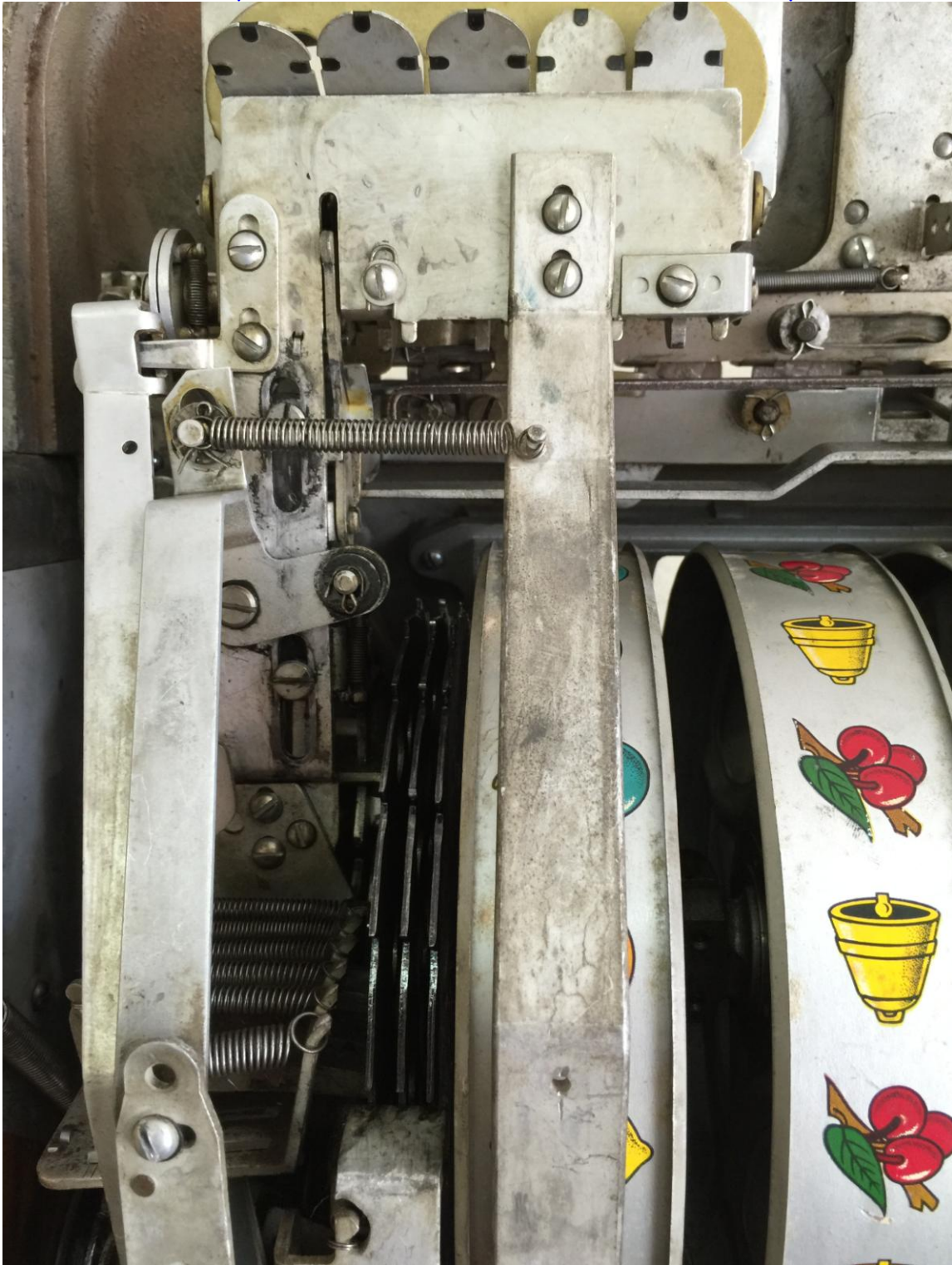
Outside view of annunciator window with the escalator filled with coins beneath it.



Inside view of annunciator window. All of the letters are laying flat. They have not been activated. Clean the window gently with a soft damp cloth. DO NOT use any harsh chemicals. Lightly dust the letters (if needed).



Inside view of annunciator from behind the machine. (The bonnet has been removed allowing this view.) The letters "B" and "O" have been activated. The other letters are awaiting activation from normal play of the machine.



Inside view of annunciator (two letters activated), support bracket, timing lever, bonus sensing lever, vertical payout levers, escalator, horizontal coin detector lever, metal reel disks, inner and outer cams, and various screws, cotter pins and springs.



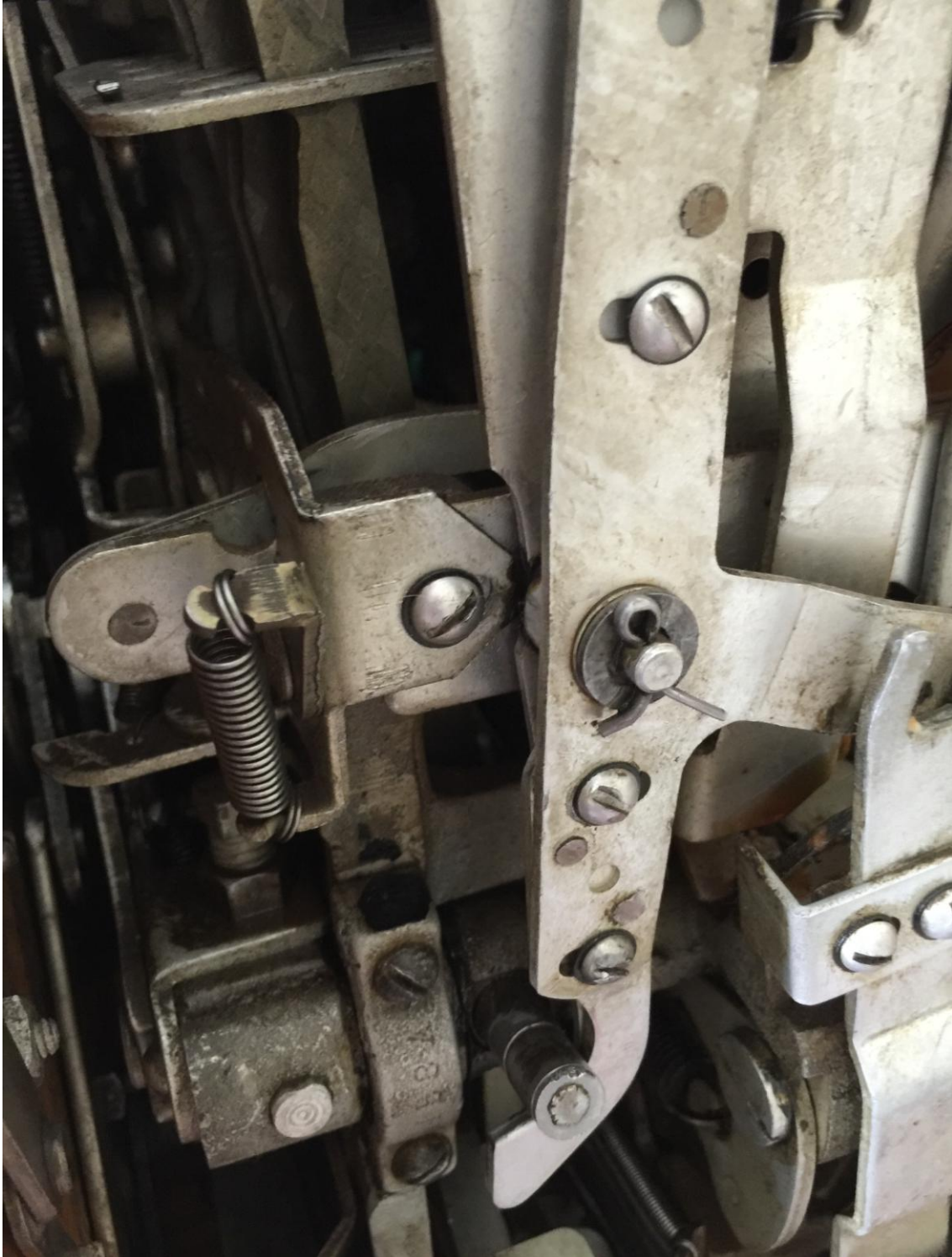
View of mechanism from the front. Reel number 1 has the letter "B" showing (this would show through the slot window). Directly in line with the letter, to the right of reel number 3, is the roller bearing in the correct position of the 5-sided cusp. Look carefully, it is below the black setscrew, next to the number 1 reel disk. It is adjusted properly for current operation. Sometimes, however, the roller bearing "slips" out of the correct cusp setting. This occurs somewhat infrequently, but is easy to remedy. Merely push the roller bearing into the correct position by using a wooden stick (similar to a chopstick, metal will scratch the idler gear, spring and lever). The bearing will slip back into the correct position. Be sure the bearing corresponds to the correct letter (B, O, N, U, or S) as shown on the number 1 reel.



Closer view of the letter "B" on reel number 1 in line with roller bearing. The vertical payout pushback lever (gray color) is visible to the upper middle right. The coin tube entrance is at the lower right.



Reel number 1 metal disk is at the background. The timing linkage is attached to the 5-pointed cusp assembly. The concave star is visible in the center of the photo. Keep this area clear of grease and dirt. Use a degreaser and lightly oil ONLY!



Vertical payout levers are visible in the upper left. The timing lever is in the front of the bonus sensing lever. Notice the linking levers from the sensing lever to the vertical payout lever assembly. The letters "MLB8A" are barely visible on the bracket (bottom center). Keep the roller bearing (center bottom) free of grease and dirt. Lightly oil the bearing and also lightly oil the vertical spring (upper left).

The Mills Horse Head BONUS



by Robert N. Geddes

Introduction

The Mills Horse Head BONUS machine, the *first* BONUS machine made by the Mills Novelty Company, was introduced in 1937. It presented a concept which was not only completely unique for Mills, but it was re-introduced in 1948 as part of the "Hi-Top" series. The mechanism itself is somewhat of a significant departure from the standard Mills mechanism requiring special assemblies, equipment, case design and major mechanical parts for the mechanism itself. The general concept was that by achieving the spelling of the word B-O-N-U-S, a special so-called extra "bonus" reward—a mini-jackpot—was given to the player.

Today the earlier version (Horse Head style) is considered more desirable than the Hi-Top version and consequently commands a greater price, both because of its apparent attractiveness as well as its rarity. Once again this was a classical case of a machine which became overly complicated, not well understood and more difficult to service—all accompanied with a certain lack of understanding of how it really worked.

Operation of the Machine

The bonus feature of the machine was to spell out the word B-O-N-U-S in sequential order by stopping on letters superimposed over the regular fruit symbols on the first (left) reel. Thus

LOOSE CHANGE

Introduced twice . . .

but never copied . . .

TABLE I
Reel Strip Layout

Reel 1	Reel 2	Reel 3
C	—	O
-O	O	L
P	C	P
C	B	B
P	C	O
ON	O	L
C	C	P
B	P	O
P	C	B
CU	O	P
L	B	L
O	O	O
C	P	P
LS	O	O
P	C	—
C	—	L
L	B	P
OB	C	O
C	O	B
P	C	L

L Lemon
 C Cherry
 O Orange
 P Plum
 B Bell
 — Bar
 Note: Bold face letters on the first reel are superimposed over the symbol shown.

when the player succeeded in getting a "B" on the first reel, a tab with the letter "B" would flip into position in the upper window. In order to get the next lettered tab ("O") to flip into place, an "O" had to appear on the first reel on the payline. No other letter would work; it had to be the next letter required to spell B-O-N-U-S, left to right.

Needless to say, once one had a B-O-N-U- in the window and showing, so that all that needed was an "S" to complete the eighteen coin payout, he would be strongly tempted never to quit playing! The more letters showing, the greater the tease to perpetuate the play of the machine. What is probably important to note is that the machine, like many other gimmicky machines, was able to give the players an intuitive feeling when the odds were or weren't against them. Or the operators

themselves took advantage of a person who either "gave up on the machine" because of the lack of money or simple indifference, and they were able to capitalize when the machine had odds in favor of the player.

As a case in point, when the machine had none of the letters showing, it was obviously a less desirable machine to play than if it had the letters B-O-N-showing.

All of the things that have been said about similar gimmick machines—FUTURITY, KITTY, etc.—are probably true for the BONUS. It was undoubtedly relegated to be an antique the day it was manufactured; the concept has never been reproduced, in spite of the high technology of the current electronic machines which is, in itself, an indication of the failure of the B-O-N-U-S spelling concept.

The only exception, which only remotely related to the concept of the B-O-N-U-S spelling concept, is the progressive jackpot. The idea of the progressive jackpot is that after a certain small quantity of plays the jackpot increases itself by a certain amount.

The Statistics

The BONUS was offered in several versions—Horse Head and Hi-Top. The Horse Head Bonus had a completely different slide structure than the Hi-Top. In either case, however, the statistics basically incorporate the concept of adding the bonus itself to the expectation that would come from a regular reel assembly. Table I shows one particular set of reel strips with the boldface italics indicating the letter overlays. Table II shows the reel inventory. And Table III shows the computation of statistical odds for the machine.

Assuming that the jackpot contained 130 coins (making a total jackpot of 150 coins since 20 are delivered by the slides) the machine pays 79.25% due only to fruit and jackpot pays. The addition of the bonus adds an additional 18% and raises the combined payout to 97.25%. The author knows of five different combinations of reel strips that were made for the BONUS; percentages ranged from as low as 65% to a high of 97.25%.

In the computations of the payouts, perhaps one of the most misunderstood concepts is how to statistically handle the concept of the bonus. Since there are twenty stops on the first reel and the player needs one letter each time, the mathematical odds are 1:20 that the particular letter required will be obtained. Since there are five letters, it

TABLE II
Reel Symbol Inventory

Symbol	Reel 1	Reel 2	Reel 3
L	3	0	5
C	7	7	0
O	3	6	6
P	5	2	5
B	1	3	3
—	1	2	1
Total	20	20	20

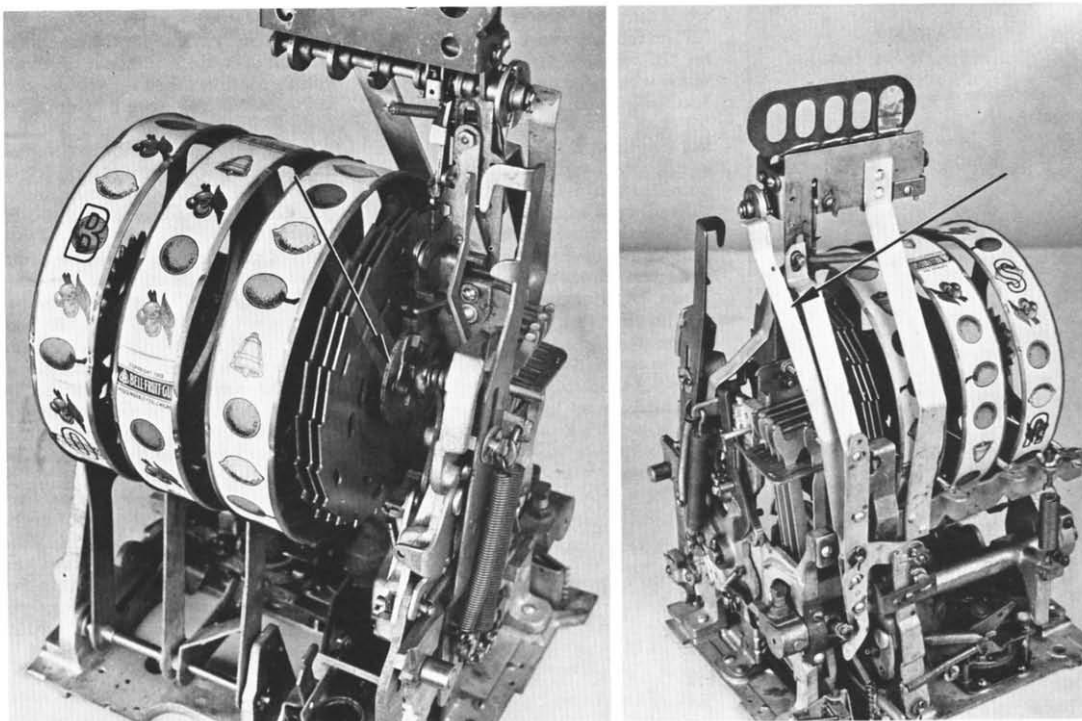
TABLE III
Computation of Odds

Winning Combinations			Number of Ways			Payout Amounts		
Reel 1	Reel 2	Reel 3	Reel 1	Reel 2	Reel 3	Total	Payout	Total
C	C	Any	7	7	12	588	3	1764
C	C	L	7	7	5	245	5	1225
C	C	B	7	7	3	147	5	735
O	O	O/—	3	6	7	126	10	1260
P	P	P/—	5	2	6	60	14	840
B	B	B/—	1	3	4	12	18	18
—	—	—	1	2	1	2	20+JP	40+2(JP)
Total Paid per 8,000 Plays								6340

Thus the percentage due to fruit and jackpot pays only, excluding the bonus feature is 79.25%.

TABLE IV
Expectation vs. Letters Showing

Letters Showing	Expectation	Increase In Odds Due To Bonus Feature
None	-5%	18%
B-	Zero	23%
B-O-	+7%	30%
B-O-N-	+22%	45%
B-O-N-U-	+67%	90%



(Left) The special sprocket, activated by sequential appearance of the B-O-N-U-S letters on the first reel, activates the special cams located underneath the lettered tabs. (Right) the payout lever is activated by the upper cams when the "S" is achieved in proper sequence. It then acts similar to the bell pay upper payout lever, depressing the lower payout levers and releasing eighteen coins. The coin tube has been removed for clarity.

should take one-hundred plays to spell B-O-N-U-S and get the bonus payoff. The placement of the letters was such that they did not interfere with the regular payouts. This allows the statistical percentage of the bonus feature to be additive to the statistical machine percentage (without the bonus) thus arriving at the overall true statistical percentage. In essence, one gets the bonus for no letter showing per one hundred plays; thus eighteen coins for one-hundred pulls gives an 18% probability of getting the bonus over the long period of time.

It should be noted that the independence of the bonus feature to the regular reel strips is assured by the fact that the "S" is over a lemon; thus there can be no simultaneous payout.

The previous discussion concerned itself with the statistics when there were none of the bonus letters showing or having been achieved. The issue addressed here is the statistics of a player starting with one or more letters and playing until the bonus is achieved. Table IV summarizes the expectation per coin played as a function of how

many of the letters of B-O-N-U-S are showing as shown in the second column. The third column shows the value of the bonus in general as a function of letter showing. Thus if a particular bonus reel assembly had a basic payout of 65% and the letters B-O-N were showing, its payout percentage would be 65% + 45% or 110%!

The Mechanism

Accompanying this article are several photographs of the BONUS mechanism. The first thing that makes the BONUS machine unique is the reel assembly itself and the special sprocket as shown by the arrow. It is this sprocket which tells the machine when the correct letter has stopped, and each time the correct letter stops this sprocket is indexed one notch—one movement representing four reel stops to the next letter which it's looking for. The lever, shown by the second arrow, simulates three bells and is released at the time that all five letters are spelled in the correct sequence. The mechanism which spells the word B-O-N-U-S is relatively straightforward and basi-

cally pops up a letter each time it's activated by the lever due to the sprocket being in the right place at the right time, and after the last letter in B-O-N-U-S is spelled it automatically resets itself and activates the payout arm in order to release the eighteen coins simulating the three bell payout.

Concluding Questions

Perhaps the most intriguing question is that since Mills made their first BONUS in 1937 and then reintroduced it in 1948, it had to—in their minds—be some sort of success.

However, no other manufacturer attempted any such similar device whatsoever during this time span. And as was usual in the case of successful slot machines, companies were willing to copy, in hot pursuit of each other, because of the competitive nature of the market. And yet, as time went on, the favor of the bonus went out of style. So why did Mills choose to do this, and why didn't the other manufacturers even try to compete with it? These questions will probably remain unans-

Continued on page 35

LOOSE CHANGE

Horse Head BONUS

Continued from page 30

wered; but it helps characterize the strange nature of the slot machine industry during this period of time.

Perhaps the greatest unanswered question is how a company like Mills, who in its heyday in the latter 1930s was the largest slot machine manufacturer in the United States, allowed itself to pass into bankruptcy in the latter part of the 1960s. Perhaps there is a lot of conjecture on not enough young blood, the legal problems and so forth, but other companies emerged to become a significant force during this time. It's sad to see a manufacturer with this type of ingenuity and quality of product pass into the annals of history as the Mills Novelty Company did.