

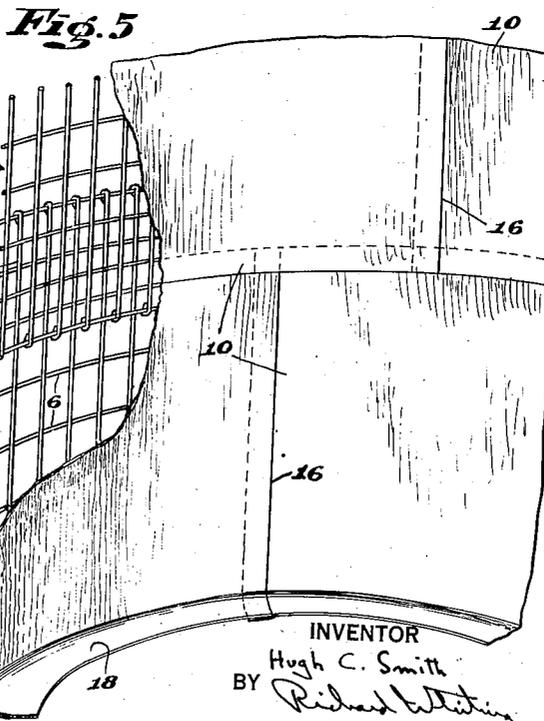
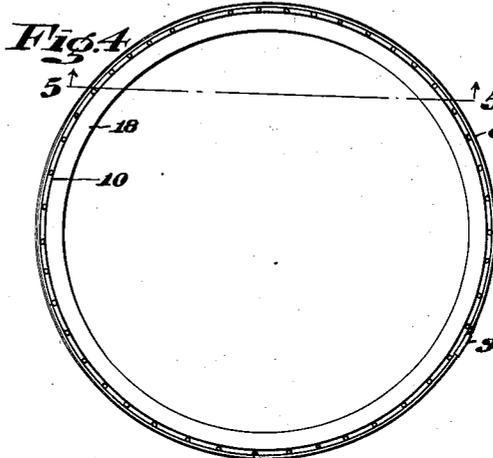
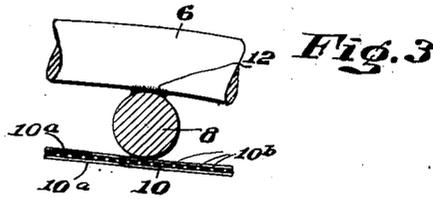
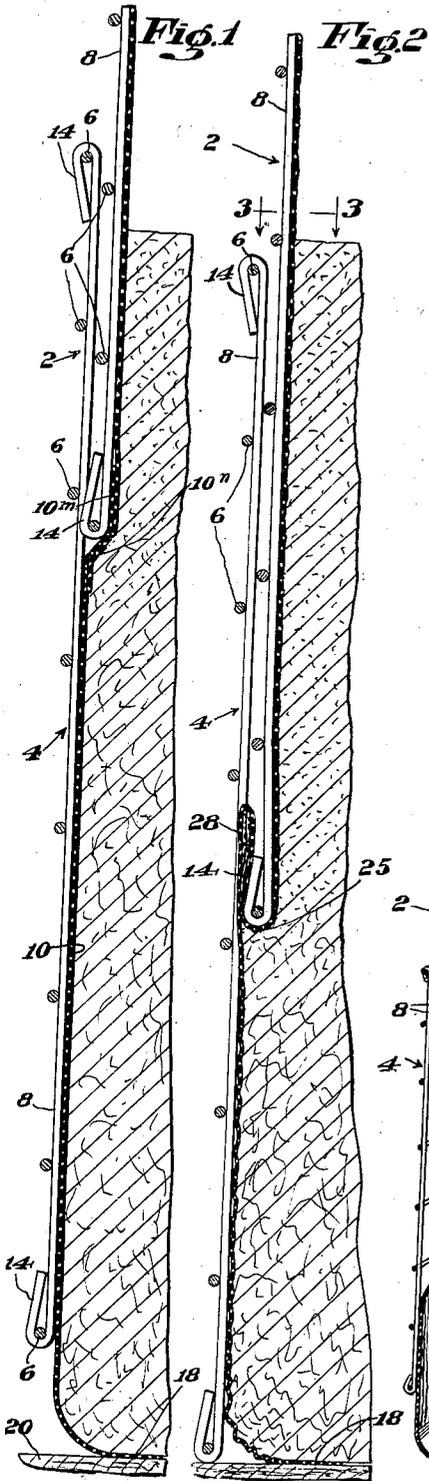
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TEMPORARY SILO AND METHOD OF CONSTRUCTION

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## TEMPORARY SILO AND METHOD OF CONSTRUCTION

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5 Claims. (Cl. 189—3)

This invention relates to temporary slips of the type made of several tiers of framing lined with paper or the like, and its object is to provide a novel silo and method of constructing it which will reduce substantially the paper breakage inherent in the use of the conventional temporary silo.

During the first two or three weeks after a temporary silo has been erected and filled, an extensive settling movement of the enclosed silage occurs. The friction between the silage and the paper lining, augmented by an increasing expansive pressure of the silage as a result of the settling, causes the silage to drag the paper down with it. My experiments have shown that the tearing of the paper lining in the conventional silo results largely from the resistance of the silo framing to this downward movement of the paper and the object of my invention is to provide a silo in which such resistance is minimized. To that end I have provided a silo construction which not only facilitates downward movement of the paper relative to the framing, but which also induces a telescoping movement of the tiers of framing relative to each other with the end result of considerably reduced frictional and abrasive resistance between the paper and the framing, and thereby of reduced paper rupture.

In the drawing—

Fig. 1 is a vertical section showing my novel runners and the method of erecting the bottom tier to avoid buckling;

Fig. 2 is a view corresponding to Fig. 1, but showing the positions of the parts after settling;

Fig. 3 is an enlarged horizontal section taken on the line 3—3 of Fig. 2;

Fig. 4 is a plan view of a silo embodying my invention, and

Fig. 5 is a perspective view partly in vertical section taken on the line 5—5 of Fig. 4.

A silo constructed in accordance with my invention is made of a plurality of vertically extending cylindrical tiers, two of which are shown in the drawing at 2 and 4. Each tier is composed of horizontal embracing members 6 and vertical runners 8. Each horizontal member joins itself as at 9 (Fig. 4) to form a circle of predetermined diameter and preferably all tiers are of the same diameter. As will be described, the silo is filled during the process of erecting the several tiers, one above the other, and before each tier is filled it is lined with a suitable material such as reinforced paper 10 (Fig. 3) composed of superposed

sheets of kraft 10a united by asphalt in which reinforcing strands 10b are embedded.

My novel vertical runners 8 (Figs. 1 and 2) are cylindrical in shape, are made of metal and have smooth, non-abrasive surfaces for engagement with the lining 10. The runners of each tier are disposed entirely within the embracing members 6 of the tier and are positioned at predetermined spaced intervals to form a plurality of smooth-surfaced tracks on which the paper may slide. The embracing members 6, on the outside of the runners, are also preferably of metal and are secured to the runners, at their intersections therewith, in such a way, preferably by welding 12 (Fig. 3), as not to interfere with the sliding movement of the paper. The diameter or thickness of the runners 8 and their spacing from each other are preferably such that although the paper, under the expansive pressure of the silage, bends around the runners 8 (Fig. 3) and may contact somewhat the embracing members 6, yet it is laterally supported by the runner surfaces for freedom of relative vertical movement between the paper and the tiers.

A desirable feature of a silo constructed in accordance with my invention is that its vertical runners not only enhance such sliding movement of the paper, but also facilitate a telescoping movement of the several tiers of framing within and relative to each other. Thereby I further reduce the friction inherent in prior silos which tends to abrade and tear the paper. Thus, where the lower portion of an upper tier 2 is enclosed within the upper portion of a lower tier 4, the points of contact between the tiers are at the points of engagement between the embracing members 6 of the upper tier and the vertical runners 8 of the lower tier. Thereby the smooth cylindrical inner surfaces of the runners 8 perform the further function of affording low friction surfaces on which the embracing members of the contiguous tier can slide.

At the upper and lower margins of each tier the extremities of the vertical runners 8 bend outwardly and around the marginal embracing members 6, to form noses 14. This construction not only facilitates a certain paper folding movement to be described, but also aids downward movement of the lower edge of an upper tier past the embracing members of the lower tier which surrounds it.

In erecting a silo constructed in accordance with my invention, the first tier is placed on the ground and is lined with paper or other suit-

able material. The width of the sheet of paper should approximate the height of the tier and to obviate paper breakage upon subsequent silage expansion it is customary not to employ a length of paper that completely covers the interior of a tier, but to use as many as three or four sections of paper, overlapping the ends as I have indicated at 16. In accordance with my invention, the bottom edge of the liner of the lowermost tier is turned in to rest on the ground a few inches as shown at 13. The liner may be temporarily secured as by clips or the like, removed after the silo has been filled.

After the bottom tier has been erected and lined and before the second tier is put in place, the filling of the first tier is commenced and when it is nearly one-half full the tier is raised two or three inches off the ground. This may be most readily accomplished by one or two men standing inside the silo. Because of the smoothness of the paper to runner contact, the paper readily stays in place during this lifting operation as I have indicated at the bottom of Fig. 1. The strength and rigidity of the paper are sufficient to prevent extrusion of the silage from beneath the tier.

The filling of the first tier then proceeds until it is two-thirds or more full when the second tier is set in place with its embracing members 6 disposed within the runners 8 of the lower tier. It is lined with paper. As shown in Fig. 1 the upper margin 10m of the lining for the lower tier overlaps the noses 14 of the runners 8 of the upper tier and the lower margin 10n of the liner for the upper tier overlaps the inside of the upper margin 10m of the lower liner. After the second tier has been completely lined, it is filled until two-thirds full or more when the third tier is set in place and, in like manner, is lined and filled. This process continues for successive tiers until the silo is completed and generally its height should approximate its diameter.

The positions of the bottom two tiers 2 and 4 relative to each other and to the ground 20 immediately after filling are shown in Fig. 1.

During the first two or three weeks after the silo has been erected and filled, the silage settles and becomes compacted and this settling is very extensive, amounting to perhaps 20% to 30% of its original height. This settling causes a substantial increase in the outward expansive pressure of the silage against the walls of the silo. This increasing pressure causes an increasing amount of friction between the silage and the inner surface of the paper liner so that the settling movement of the silage effects a considerable downward drag on the paper tending to pull it down with it. By affording a plurality of smooth vertically extending runner surfaces on which the paper can readily slide downwardly relative to the tiers of framing, I insure that the paper does not become abraded and torn during the settling movement, but instead becomes somewhat crinkled as I have shown in Fig. 2 while remaining impermeable. The strain on the paper is further reduced by the telescoping movement of the tiers of framing illustrated by a comparison of Figs. 1 and 2, thereby minimizing the tendency of the silo framing to hold back on the paper as it is urged downwardly by the descending silage.

The noses 14 at the extremities of the lower ends of the runners 8 of an upper tier (Fig. 2) deflect the overlapped margins 10m and 10n of the upper and lower liners above described and

cause the paper to lap at 25 around the noses and around the lower embracing member 6. This causes the paper to accumulate in the fold 28 as the upper tier descends.

The descending movement of the tiers, facilitated by the runners 8, is further enhanced by initially raising the lower tier from the ground and subsequently letting it resume its position in contact with the ground during the silage settling. Thereby I insure against such resistance to the descending movement of the tiers of framework as would result from the lower tier initially abutting the ground. The relative amounts of settling of the silage, the paper and the wall tiers are such that the paper accumulates in the fold 28 as I have indicated. The space left at the top of the silo after the silage has settled can be filled with more silage and usually I plan for this when filling the silo by providing an additional ring of lining which protrudes out of the top of the silo and is filled with silage above the limits of the tiers. This surplus settles to within the uppermost tier and the protruding paper is folded in as a covering.

The preferred embodiment of my invention which has been described above may be variously modified without departing from the spirit of my invention, which is to be limited only as the appended claims require.

I claim:

1. A temporary silo composed of a plurality of telescoping wall tiers each comprising horizontally embracing members and a plurality of smooth convexly curved vertical runners disposed within the embracing members and secured thereto, and a lining disposed in sliding engagement with the runners, the embracing members of one tier being disposed within and contiguous to the convex surfaces of the runners of the tier next below it, whereby vertical movement of the lining and telescoping of the tiers are facilitated.

2. A temporary silo composed of a plurality of telescoping wall tiers each comprising horizontally embracing members and a plurality of smooth convexly curved vertical runners disposed within the embracing members and secured thereto, noses formed on the lower extremities of the runners and a lining covering the noses and disposed in sliding engagement with the runners, the embracing members of one tier being disposed within and contiguous to the convex surfaces of the runners of the tier next below it to facilitate telescoping of the tiers, and the said noses being adapted to fold in the slack of the lining during such telescoping movement.

3. A temporary silo composed of a plurality of telescoping wall tiers, each comprising horizontally embracing members and a plurality of smooth vertical runners disposed within the embracing members and secured thereto, noses formed on the lower extremities of the runners of an upper tier received within the confines of the tier next below it, a lining slidably engaging the runners and curving inwardly around the noses, whereby when said upper tier telescopes within said lower tier the lining laps about the noses and accumulates in a fold between the tiers.

4. A temporary silo composed of a plurality of telescoping wall tiers, each comprising horizontally embracing members and a plurality of vertical runners disposed within the embracing members and welded thereto, and a lining of paper,

the embracing members of one tier being disposed within and contiguous to the runners of the tier next below it, the said runners presenting smooth metallic faces for sliding contact with both the lining and the embracing members of a contiguous tier, whereby a descending movement of the lining and telescoping of the tiers are facilitated when the silage settles.

5. The method of erecting a silo composed of telescoping wall tiers which consists in erecting

the lowermost tier to rest on the ground, applying a lining to the tier and lapping the lining on the ground, depositing silage into said tier, raising the tier a predetermined distance from the ground without substantially raising the lining, superimposing, lining and filling the succeeding tiers and subsequently allowing the silage, lining and tiers to settle until the lowermost tier again abuts the ground.

HUGH C. SMITH.