T. L. JAMES & W. H. BEESON.

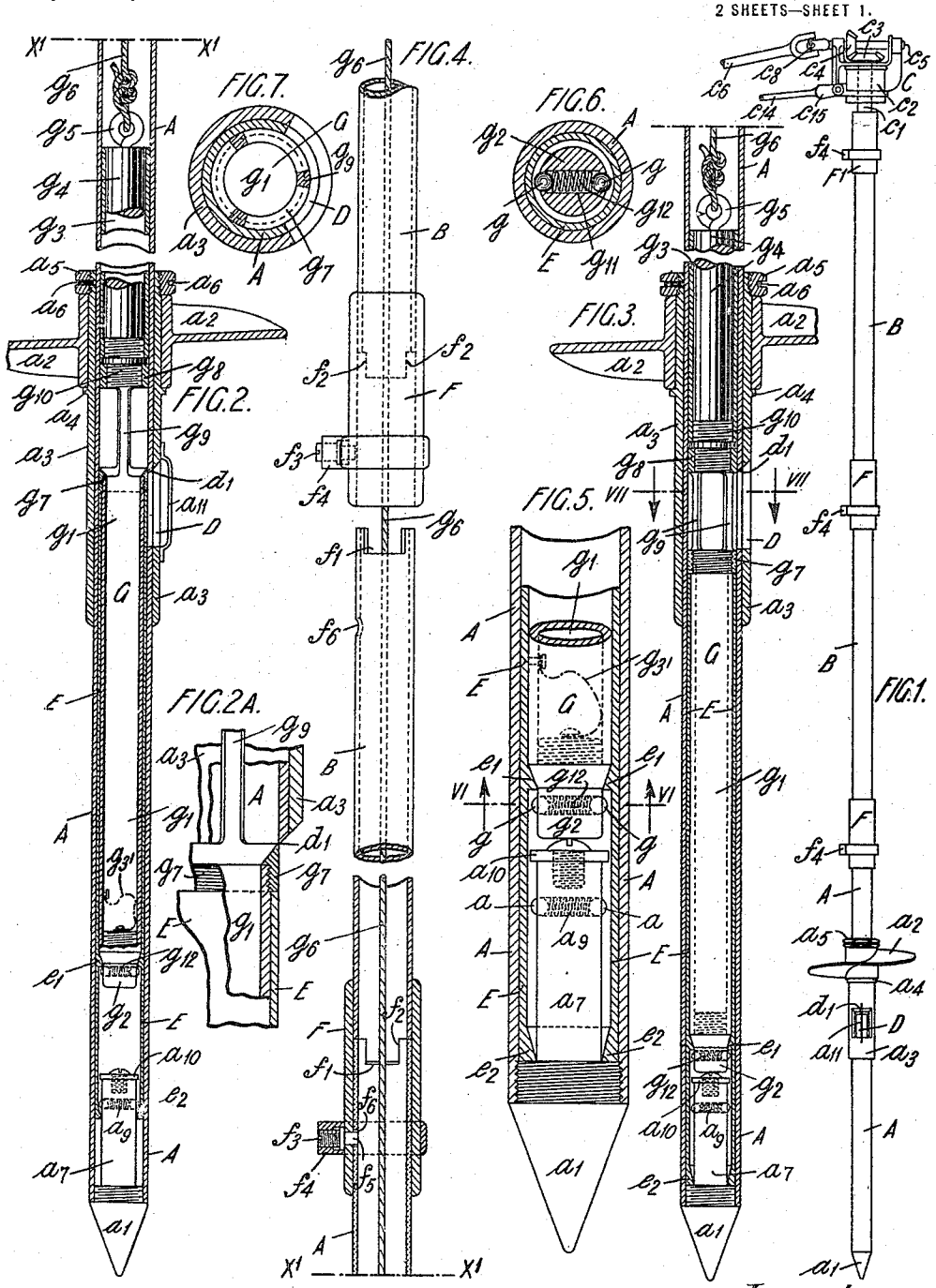
GRAIN SAMPLER.

APPLICATION FILED NOV. 6, 1915.

1,229,273.

Patented June 12, 1917.

2 SHEETS—SHEET 1.



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GRAIN SAMPLER.

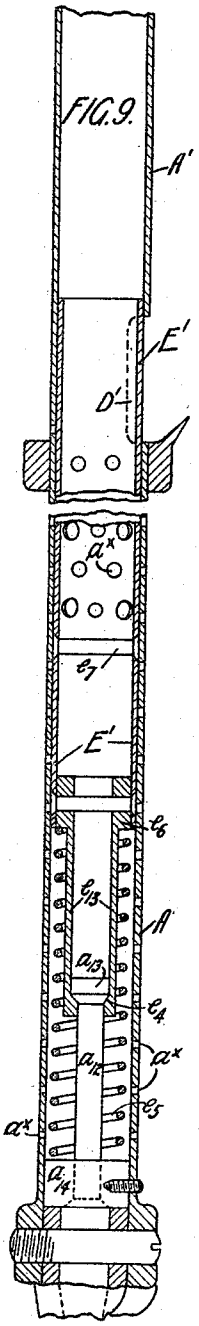
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2 SHEETS—SHEET 2.

FIG. 9.



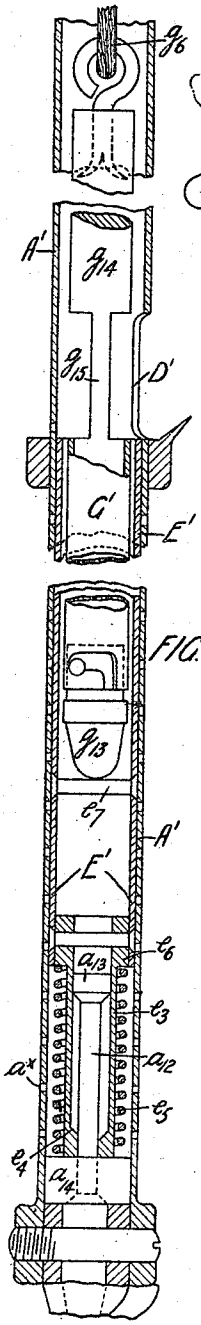
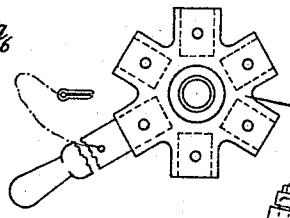


FIG. 13.



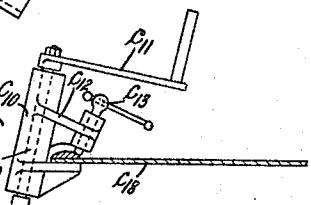
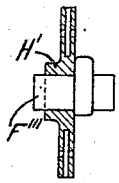


FIG. 14.



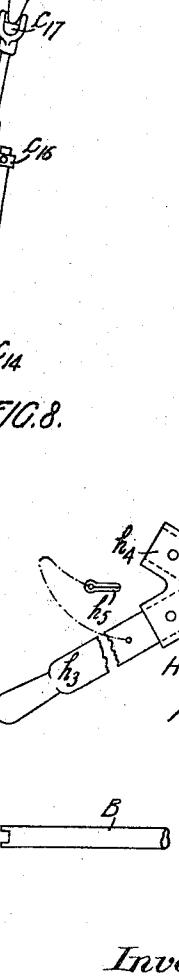


FIG. 8.

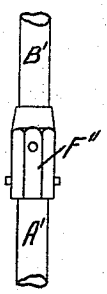


FIG. 11.

FIG. 12.

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GRAIN-SAMPLER.

1,229,273. Specification of Letters Patent. Patented June 12, 1917.

Application filed November 6, 1915. Serial No. 60,092.

To all whom it may concern:

Be it known that we, THOMAS LISTER JAMES, a subject of the King of Great Britain, and residing in Higher Tranmere, in the county of Chester, England, and WILLIAM HENRY BEESON, a subject of the King of Great Britain, and residing in Rock Ferry, in the county of Chester, England, have invented certain new and useful Improvements in Grain-Samplers, of which the following is a specification.

This invention relates to improvements in apparatus for ascertaining the temperatures of, and for taking samples from granular and the like material stowed in bulk, and is particularly applicable in the case of wheat or corn stowed in bulk, in ships' holds or in grain warehouses.

The invention is illustrated in the accompanying drawings, in which Figure 1 shows the general arrangement, Fig. 2 is an elevation in longitudinal section to a larger scale of the lower portion of the tubular structure showing the bucket in the position therein which it occupies prior to the opening of the port; Fig. 2A is a fragment of Fig. 2 to a larger scale, Fig. 3 is a view similar to Fig. 2 but shows the bucket in the position which it occupies after the port is opened. Fig. 4 is a view partly in longitudinal section and partly in outside view, of the mode of jointing the successive lengths of the tubular drill; Fig. 5 is a view in transverse section to a larger scale of the device by means of which the port is controlled through the medium of the bucket; Figs. 6 and 7 are transverse sections to a larger scale, on the lines VI, VI and VII, VII, respectively of Figs. 5 and 3; Fig. 8 is a view of the device for rotating the tubular drill, and Figs. 9, 10, 11, 12, 13 and 14 are views of a modification, Figs. 9 and 10 being longitudinal sections similar to Figs. 2 and 3, Fig. 11 showing a modified form of joint, and Figs. 12, 13 and 14 show modified forms of turning devices for imparting rotary movement to the tubular drill.

Referring first to Figs. 1 to 8,—

A is the lowermost length of the tubular drill; B are the upper lengths which are added in succession as the drill penetrates the corn or other material, and C is the device by means of which rotary motion is imparted to the tubular drill; the length A which is closed at the bottom, is provided with a pointed end a^1 and a port D, and is fitted with a sleeve E which normally closes the port D. The lower end of each upper length is provided with a coupler F which is adapted to fit over the upper end of the preceding length, the upper ends being notched as at f^1 and the lower ends being notched as at f^2 so as to form engaging jaws adapted to transmit torque from one length to the other.

The upper end of the coupler F is secured by brazing or the like to the lower end of each length B, and the lower end of the coupler is adapted to fit over the upper end of any of the lengths and is provided with a screw f^3 fitting a screw-threaded boss f^4, the nose f^5 of the screw being adapted to fit in holes f^6 formed in the upper end of each length.

The driven part of the preferred form of the device C for rotating the tubular drill is a duplicate of the lower end of the lengths B, that is to say, it comprises a length of tube with notches f^2 at the lower end and a coupler F′ with boss f^4 and screws f^3.

The coupler F′ is mounted on a spindle c^1 carried in a vertical bearing in the bracket c^2; at the upper end a bevel wheel c^3 is keyed to the spindle c^1, and a bevel pinion c^4 keyed to a shaft c^5 carried in bearings in the bracket c^2 gears with the bevel wheel c^3. The shaft c^5 is articulated to a shaft c^6 by the universal coupling c^8; the lower part of the shaft c^6 is hollow and a square extension shaft c^7 fits telescopically in a square bore of c^6 so that while c^7 rotates with c^6 the length of the combination c^6, c^7, can be adjusted.

The extension c^7 is in turn articulated by the universal coupling c^{17} to the shaft c^9 carried on a bracket c^{10} and adapted to be operated by a handle c^{11}.

The bracket c^{10} is provided with a flange c^{12} and clamping screw c^{13} by means of which the bracket may be detachably secured to a hatch coaming or any other suitable fixed supporting part c^{18}. The bracket c^2 is prevented from rotating about a vertical axis by means of the rod c^{14}, the jaw c^{15} of which is pinned to the bracket c^2 and to the tail of which a stirrup c^{16} is fitted which embraces the shaft c^6.

The lowermost length A is provided with a helical propeller a^2 which fits on an external sleeve a^3 secured to the lowermost section A, and is held in place axially on the said sleeve between the flange a^4 and nut a^5,

the latter being fitted with a spring a^6 arranged in a circumferential notch in the nut and having a radial portion normally pressed inwardly and adapted to engage with a hole in the sleeve a^3 and so prevent the nut from backing off.

If the lowermost part A be inserted in say a cargo of grain on board ship and the coupler F′ of the turning device be fitted to the upper end of this length it will be seen that on being rotated the helical propeller will cause this length to screw into the grain; when the greater part of this length is inserted the upper length B is fitted to the length A and the coupler F′ of the turning device fitted to the upper length B, the connected lengths being rotated until the part B is almost submerged in the grain whereupon additional lengths are similarly fitted and rotated until the desired length of sectional tubular drill is obtained, this length being of course dependent on the depth of the grain, in say, the hold of the ship.

In order to ascertain the temperature of the grain, a thermometer provided with a maximum indicating device is lowered into the tubular drill through the upper end thereof, temperature being taken at successive vertical depths as the drill is screwed into the grain.

It is necessary in order to ascertain the condition of the grain that samples thereof should be taken at several levels and in order to accomplish this the bucket G is lowered into the bore of the tubular drill, the weight of the bucket being utilized to depress the sleeve E which opens the port D and allows the grain to enter and to fill the bucket.

The construction of the bucket and sleeve and the means by which the former actuates the latter are as follows:—

The bucket comprises a lower part g^1, the bottom of which is closed by a stopper plug g^2 which can be withdrawn to empty the grain, and which is connected to the bucket by a chain g^{31} to prevent the loss thereof, and an upper part g^3 which is loaded by filling it with a lead core g^4, the length of the core being sufficient to give the necessary weight to the bucket; an eyelet g^5 is attached to the upper end of the bucket and takes the cord g^6 by which the bucket is raised and lowered. The upper and lower parts of the bucket are connected together by a bridge-piece the lower part g^7 of which screws onto the upper end of the part g^1 and the upper end g^8 of which is connected to the lower end g^7 by a plurality of narrow connecting pieces g^9, said upper end screwing onto the lower part of a plug g^{10}, the uppper part of which screws into the upper part g^3 of the bucket; the bridge-piece thus serves to connect the upper and lower parts of the bucket together and yet leaves comparatively free access to the lower part of the bucket through the opened upper end thereof, when the latter is below the port D, as in Fig. 3.

The port D is formed in the sleeve a^3 as well as in the wall of the length A, and the upper edge d^1 of this port is shaped to form a knife or cutting edge as shown; in the same way the upper edge of the lower end of the bridge-piece forms a knife edge so that as the bucket is withdrawn any grain interposed between these edges is sheared off.

The sleeve E is provided with two annular detents or engaging surfaces e^1 and e^2; the stopper g^2 at the bottom of the bucket has a transverse recess g^{11} at the opposite ends of which are located two hard metal balls g; the balls are pressed outwardly by an interposed spring g^{12}, and the ends of the transverse recess are so shaped that while they allow the balls to protrude, the openings in the end thereof do not allow the balls to be pressed out altogether.

The pointed end a^1 screws into the lower end of the length A and has an extension a^7 provided with a transverse recess adapted to take the balls a and spring a^9 which are arranged after the manner just described in connection with the balls g. The upper end of the extension a^7 is fitted with a washer a^{10}.

The action of this part of the apparatus is as follows;—

Normally the sleeve E lies a little higher than the position shown in Fig. 2 being supported by the engagement of the lower detent e^2 with the balls a; when the bucket G is lowered into the bore of the tubular drill the balls g meeting the inclined surfaces of the upper detent e^1 are pressed in and pass the detent e^1, the force necessary being less than that required to force the detent e^2 over the balls a. When the shoulder formed by the end g^7 of the bridge-piece engages with the top of the sleeve E (see Fig. 2) the sleeve is pressed downwardly by the total weight of the bucket, and this is sufficient, especially if percussion is resorted to, to force the lower detent e^2 past the balls a whereupon the port D is opened as the bucket G and sleeve E descend together, being fully opened when they reach the lowermost position as shown in Fig. 3. The tubular drill is then rotated to and fro and causes the grain to enter through the port D and fill the bucket, the movement of the grain through the port being facilitated by a bar a^{11} stretching across the center of the port.

When the bucket is withdrawn the balls g engage with the under and squarer face of the upper detent e^1 the upward movement of the bucket carrying the sleeve with it with a force sufficient to draw the detent e^2 over the balls a until the upper edge of the sleeve reaches a position vertically above

the edge d^1 of the port, thus closing the port, whereupon further movement of the sleeve is arrested by the engagement between the detent e^2 and the washer a^{10}. When the bucket is withdrawn the sleeve is prevented from dropping by the engagement of the under face of the detent e^2 with the balls a. When the bucket is withdrawn from the tubular drill the sample taken therein may be conveniently released by screwing out the stopper g^2 or by inverting the bucket.

In the modification illustrated in Figs. 9, 10, 11 and 12, A′ is the lowermost length and the port D′ is closed by a spring controlled sleeve E′, the bucket G′ as before is weighted and is sufficiently heavy to depress the sleeve E′ in opposition to the spring.

In this construction the sleeve is provided with a hollow tail piece e^3 into which projects the stopper spindle a^{12}, the head a^{13} of which fits the the seating e^4 of the bottom of the tail piece and limits the upward movement of the tail piece and the sleeve, see Fig. 9. A spiral spring e^5 is interposed between the plug a^{14} (which closes the bottom of the lowermost length A′) and the shoulder e^6 of the tail piece, which spring is sufficiently powerful to move the sleeve into its upper position shown in Fig. 9 in which it closes the port D′. In Fig. 10 the bucket G′ is shown lowered into position, the stopper g^{13} which is attached to the bucket by a bayonet joint and closes the lower end thereof comes into contact with the bar e^7 fixed across the sleeve E′, the weight of the bucket causing the sleeve to be depressed into the position shown in Fig. 10 in which position the port D′ is opened, the upper weighted part g^{14} of the bucket is as in the arrangement already described connected to the lower part by side pieces g^{15} which permit access to the grain from the port D′ into the bucket. Fig. 11 shows the mode of connecting the successive lengths by means of a coupler F″ of hexagonal configuration; couplers F″ are attached by brazing to the upper end of the lowermost length A′ and to the upper end of each of the upper lengths B′ and the abutting surfaces of the lengths A′ and B′ are notched as before to take the turning torque.

The successive lengths are rotated by means of a wrench H having a central hexagonal opening h^1 which fits the coupler F″ and is held in place thereon by a spring controlled snap bolt h^2; lever arm or arms h^3 fitted in one or other of the several sockets h^4 being held in position by the pin h^5 which fits in a hole in the socket and a hole in the lever.

A similar wrench H′ may be provided to rotate the several lengths of the tubular drill as illustrated in Figs. 1 to 8; in this case instead of the wrench having a hexagon opening it is fitted with a coupler F‴ similar in construction to the coupler F fitted on the turning device C, see Fig. 8.

While we have described the drill as being inserted vertically into the material, it may be inserted horizontally into the material, in which case the cord g^6 would be replaced by a member capable of transmitting a thrust.

The length A as well as the sleeve E is preferably provided with a series of perforations small enough to prevent the passage therethrough of the granular material, the object of the perforations being to insure the interior of the length A quickly reaching the temperature of the bulk of the grain. These perforations are shown at a^x.

Having now fully described our invention, we declare that what we claim, and desire to secure by Letters Patent is:—

1. The improved apparatus for ascertaining the temperature of and for taking samples from granular or the like material stowed in bulk, consisting of a tubular drill open at one end and closed at the other and having near the closed end a through port, said drill being provided with a helical propeller; means for rotating the drill; a bucket adapted to be introduced into the tubular drill until the open top of the bucket reaches a point beyond the port; and means which normally close the port and adapted to be moved clear of the port by contact with the bucket; substantially as described.

2. In apparatus for ascertaining the temperature of and for taking samples from granular or the like material stowed in bulk, in combination; a tubular drill arranged in sections adapted to be non-rotatably coupled together, the lowermost section being provided with a helical propeller and a through port; means for rotating the drill; a bucket adapted to be introduced into the tubular drill until the open top of the bucket reaches a point beyond the port; and means which normally close the port and adapted to be moved clear of the port by contact with the bucket; substantially as described.

3. In a device for ascertaining the temperature of and for taking samples from granular or the like material stowed in bulk, in combination; a tubular drill fitted with a propeller and a through port; means for rotating the drill; a sleeve normally adapted to close the port; and a bucket adapted to be introduced into the drill to pass into the said sleeve and to move it clear of the said port; substantially as described.

4. In a device for ascertaining the temperature of and for taking samples from granular or the like material stowed in bulk, in combination; a tubular drill fitted with a propeller and a through port; means for rotating the drill; a sleeve provided with a detent; a bucket adapted to be introduced into the drill and to enter the said sleeve,

said bucket being provided with elastically controlled means adapted to engage said detent, and with means which engage the sleeve and move it clear of the port, the engagement of the said elastically controlled means with the detent being adapted as the bucket is withdrawn to return the sleeve to the normal position in which it closes the said port; substantially as described.

5. In a device for ascertaining the temperature of and for taking samples from granular or the like material stowed in bulk, in combination; a tubular drill fitted with a propeller and a through port; means for rotating the drill; a sleeve provided with a detent; elastically controlled means connected to the tubular drill adapted to engage the said detent and to elastically hold the sleeve in the position in which it closes the port; a second detent on the sleeve; a bucket adapted to be introduced into the drill and provided with means adapted to engage the said sleeve and to move it in opposition to the said elastically controlled means into a position in which the port is open, said bucket being provided with elastically controlled means adapted to engage the said second detent in opposition to the first mentioned elastically controlled means and to move the sleeve into a position in which the port is open, and as the bucket is withdrawn to return the sleeve into the position in which it closes the port; substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

THOMAS LISTER JAMES.
WILLIAM HENRY BEESON.

Witnesses:
J. E. LLOYD BARNES,
JOSEPH E. HIRST.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."