(No Model.)

O. P. HURFORD.

SCREEN FOR BOLTING FLOUR.

No. 399,616. Patented Mar. 12, 1889.

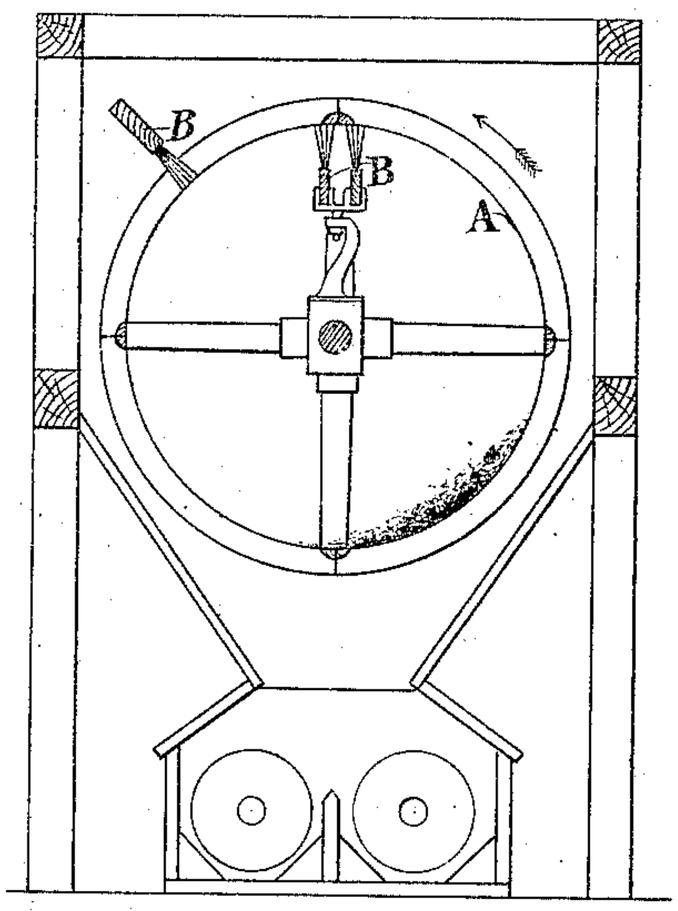

Fig. II

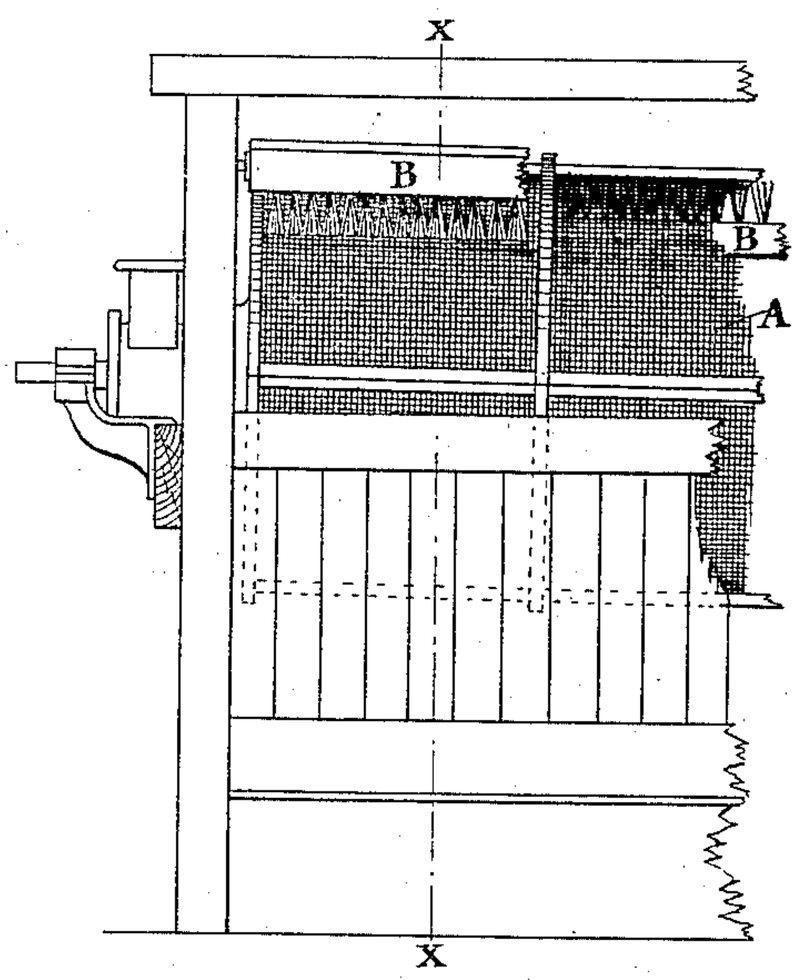

Fig. I

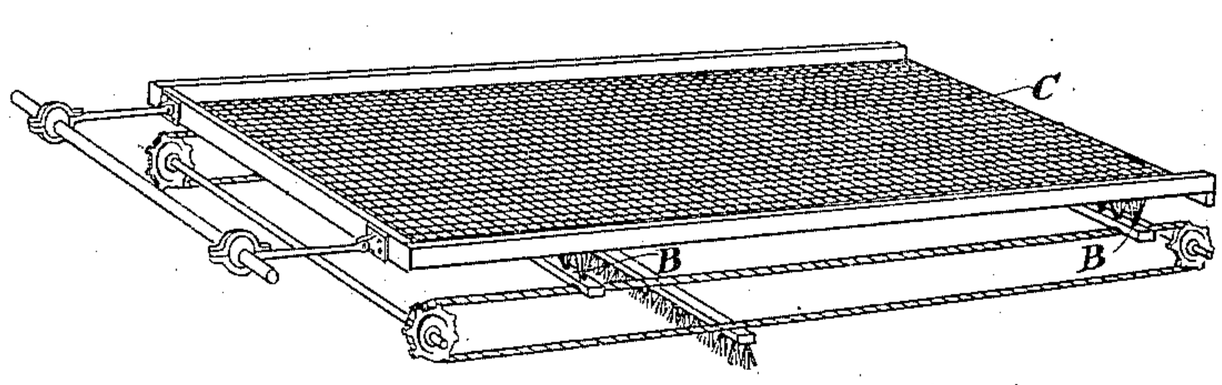

Fig. III

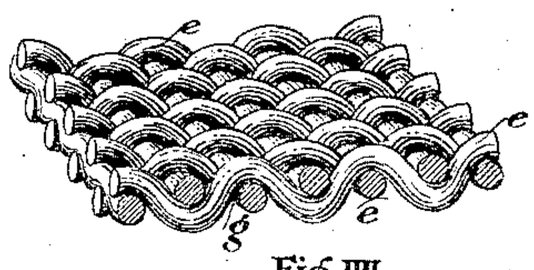

Fig. IIII

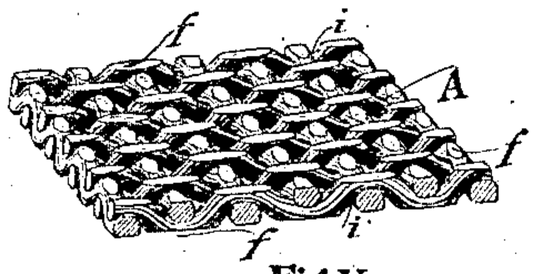

Fig. V

Fig. VI

Fig. VII

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SCREEN FOR BOLTING FLOUR.

SPECIFICATION forming part of Letters Patent No. 399,616, dated March 12, 1889.

Application filed April 5, 1888. Serial No. 269,700. (No model.)

To all whom it may concern:

Be it known that I, OLIVER P. HURFORD, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Screens for Bolting Flour; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

My invention relates to that class of screening-machines (either flat or tubular in form) in which the screening-surface is located in a nearly or quite horizontal position and has imparted to it some sort of motion that operates to agitate the material to be passed through said screening-surface.

Previous to my invention it has been customary in the construction of such screens (used mostly in the manufacture of flour) to employ for the purpose of separating from the mass of material the coarser particles screens or sieves, composed of a woven wire fabric, (cylindrical, flat, or otherwise shaped,) and for the purposes of screening out the finer particles or grades of the flour bolting-surfaces composed of a woven silk fabric. In the use of such wire-woven fabric (employed mostly in those screens familiarly known as "scalpers") more or less difficulty arises from the fact that in practical operation this ordinary woven-wire fabric is of such a structural character that not only are pocket-like recesses (of comparatively great capacity) afforded within which numerous collections of the small particles of the material being treated accumulate and pack, thus more or less clogging up the meshes of the screen and impeding the flowing over its surface freely, and the passage through its meshes easily of the particles of material which should readily pass through the screen, but, furthermore, (the structural character of this ordinary wire screen) is such that its innumerable abrupt projections so forcibly oppose the action of the brushing device (that must be employed in all such screening contrivances) as to very rapidly wear out the brush. Again, a thorough cleaning off of (or cleaning out of the meshes of) the screening-surface, or, in other words, a perfect clearance of the meshes of the screening-surface, is rendered difficult, if not impracticable, by reason of the constant presence of the accumulated flour in the pocket-like recesses just above referred to, which flour tends to "paste over" the meshes during the brushing operation, and to thus partially destroy the efficiency of the screen.

I propose by my improvement to provide for use a woven-wire screening-surface which shall be comparatively free from the objections just explained as being peculiar to such wire screens as have been heretofore made and used; and to this main end and object my invention may be said to consist, essentially, in a wire-woven screening-surface having all the projecting portions or points of the interlaced wires flattened, (in any suitable manner, preferably by subjecting the ordinary woven-wire fabric to a rolling or calendering operation,) so as to render the operative surface of the screen comparatively smooth, and so as to also very materially lessen the capacity of its ledge-like projections and of its flour-retaining recesses, all as will be hereinafter more fully explained and as will be more explicitly pointed out in the claim of this specification.

To enable those skilled in the art to which my improvement relates to understand and practice the same, I will now proceed to more fully describe it, referring by letters of reference to the accompanying drawings, which form a part of this specification, and in which I have shown my invention carried into effect in two (of the various well known) forms of screening-machine to which it is applicable.

In the drawings, Figure 1 is a side view of an ordinary form of cylindrical scalper or screening-machine such as now commonly used in flouring-mills, but embodying my improvement. Fig. 2 is a vertical cross-section of the cylinder at the line $x\,x$ of Fig. 1, showing more particularly the relative arrangement with the cylinder of one of the usual forms of brushing devices and illustrating the presence of the material that is fed into, retained in, and passed through the screening-cylinder. Fig. 3 is a longitudinal perspective of so much of a machine provided with a flat screening-surface as it is necessary to show for the purpose of exhibiting and explaining the application of my improvement to this

form or type of screening-machines, (used mostly for screening out what are termed "middlings.") Fig. 4 is a detail view, on an exaggerated scale, of a small piece of such woven-wire fabric as has been known and used for screening the materials in the manufacture of flour prior to my invention. Fig. 5 is a similar view of a piece of the woven-wire fabric used according to my invention in the cylindrical and also in the flat-surfaced screening-machines seen, respectively, in Figs. 1, 2, and 3, in which figures, however, the scale is too small to permit any intelligible illustration of the precise structure of said woven fabric. Fig. 6 is a skeleton or sort of diagrammatical view showing, on an exaggerated scale and in cross-section, portion of a screen made in the old-fashioned way and illustrating how the flour is apt to lodge within the small pocket-like recesses of the woven-wire fabric. Fig. 7 is a similar view of portion of a screen such as seen at Figs. 1, 2, and 3, made according to my invention and illustrating the action of such improved screening device.

Each of the sectional views 6 and 7 is drawn on a plane of section passing adjacent to one of the strands of the woven-wire fabric of which the screen is (in each case) supposed to be made, and in all the views in which arrows are seen they indicate the directions of movement of the screens, and also of the material being treated.

Wherever the same part is shown in different figures it will be found designated by the same letter.

In the machine shown at Figs. 1 and 2, A is the screening-cylinder, constructed, mounted, and operating in the usual and well-known manner, except that its screening-surface is composed of a different sort of woven-wire fabric, and B is the brushing device, arranged and operating in one of the well-known ways.

In Fig. 3 the flat screen C is constructed, mounted, and suitably agitated with a sort of reciprocatory motion, all in the usual well-known manner, except that the woven-wire fabric composing the screening-surface is, like that of the cylindrical machine shown, of a different structural character.

In both forms of machine shown as embodying my invention the screening-surface (marked A in one case and C in the other) is made of a fabric that is first woven of wire strands of equal size and exactly similar to the fabric heretofore used, and that is subsequently subjected to pressure superficially, (preferably by passing the fabricated material between compressing-rollers,) so as to upset the stock of and flatten out (so to speak) all the abruptly-projecting portions or all the superficial protuberances of the fabric at the localities where the interlaced metallic strands overlie (or underlie) each other. In other words, the metallic woven fabric of which these screening-surfaces are composed is one which results from taking the fine woven-wire fabric, heretofore usually employed in the construction of screens and subjecting it to superficial pressure (preferably by passing it between compressing-rolls) in such manner and to such extent as to change its condition from that shown at Figs. 4 and 6 (which show the old-fashioned fabric) to that seen at Figs. 5 and 7, which show the fabric used in my improved machine; and by a reference to and comparison of what is shown, respectively, in Figs. 4 and 6 and 5 and 7 it will be readily seen that while in the fabric heretofore employed in the construction of screening-machines the multitudinous abrupt projections *e* (see Figs. 4 and 6) present serious obstruction to a free tumbling and sliding movement over the screening-surface of the particles designed to be passed through the meshes of the screen, this source of obstruction to a free movement of these particles over the said screening-surface has been in a great degree removed in the fabric used in my improved machines, since by the flattening down of these projections, as seen at *f*, (see Figs. 5 and 7,) the metallic superfices of the screen have been rendered smoother. In other words, by thus flattening out (or mashing down) all the abrupt projections, as shown at Figs. 5 and 7, the asperities of the old-fashioned screening-surface have been materially softened or removed, so that the light and fine particles of the mass of the material supported upon and agitated on the screening-surface of the improved machine will move over said surface with more freedom, and hence be afforded more opportunities to pass through or greater in finding their way through the meshes of the screen. Furthermore, in a machine provided with the kind of fabric shown at Figs. 5 and 7, as both surfaces of the fabric are thus smoothed, so to speak, the brush employed to keep the screen clear or clean (whether applied to one or the other of the surfaces of the woven fabric) will not be abraded by frictional contact with the screen nearly as much, and consequently will not be worn out (or have its efficiency impaired) nearly as soon as the brushing devices used in machines provided with the old-fashioned kind of metallic screening device.

The comparison of this new kind of flour-screening machine fabric with the old-fashioned sort also shows that while in the kind seen at Figs. 4 and 6 the interstices or receptacle-like recesses (seen at *g*) are of sufficient capacity to retain considerable quantities of the flour, these recesses in the kind of fabric shown at Figs. 5 and 7 are, as shown at *i*, so reduced in size and in their capacity to retain portions of the fine particles of the material being treated as to practically overcome a heretofore serious difficulty—viz., the rapid accumulation in these interstices of sufficient quantities of the flour to not only partially clog the meshes, and thus impair their function, but to also cause the "pasting" over of the screening-surface by the action of the brush on these accumulations of flour.

Among the leading advantages of this rolled wire-cloth is its use in scalping the material from the different breaks on wheat in the roller process of milling and for grading the various sizes of middlings, in doing which it does not grind, rasp, or abrade the material, as is the case when the ordinary rough-surfaced woven wire is used.

In the ordinary operation of scalping off the middlings from what is known as "break-stock" in roller-milling the common woven-wire cloth rasps or grates off a large portion of fluff and fine middlings, which go into the flour to discolor it and increase the proportion of the lower or less valuable grades. Then in grading the middlings, after having been scalped off, the smooth-surfaced or flattened wire-cloth does not wear or flour the middlings, in consequence of which a large portion of flour is sent to the purifiers, and consequently thrown to the dust-room, at a great loss to the miller, as does the old-fashioned rough-surfaced cloth.

By the use of the flattened or smoother surfaced woven-wire screening-surface the machine is adapted to the grading of the finer qualities of middlings, which heretofore could be done only on a kind of silk cloth known as "grits-gauze" at a heavy expense, as the sharp middlings cut out the grits-gauze very rapidly, rendering it necessary to frequently replace it. The smooth-surfaced wire-cloth does the work equally as well and will last a year.

Among other and minor advantages to the screening-machine resulting from the use therein of a bolting or screening wire fabric of the novel character herein shown and described may be mentioned the ironing out (so to speak) of all the puckers or superficial wave-like irregularities, which always exist in fine woven-wire fabrics as they come from the weaving-machine, whereby a fabric for the screening-surface (whether flat or curved) is provided for use that may be formed into either a perfect plain or a perfect curve, so that the brushing device will properly sweep over every point throughout the whole surface designed to be acted upon by such brush.

Furthermore, in the use of such a metallic fabric, for the screen the meshes may be made smaller and hence a finer wire screen can be employed (wherever this may be desirable) than could possibly be used in the construction of a wire screen as heretofore made.

Having now so fully explained the construction and operation of my improved flour-screening machine that those skilled in the art can readily understand and practice my invention, and wishing it to be understood that I do not claim, broadly, as a new manufacture, a flattened woven-wire fabric, such a fabric being old *per se*, what I do claim as new, and desire to secure by Letters Patent, is—

A machine for screening or bolting flour having its screening-surface composed of a flattened woven-wire fabric, substantially as and for the purposes set forth.

In witness whereof I have hereunto set my hand this 30th day of March, 1888.

OLIVER P. HURFORD.

In presence of—
E. A. TURNER,
W. P. SISSON.