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(19)



(54) IMPROVEMENTS IN OR RELATING TO TROMMEL SCREENS

- (71) We, PERNAS CHARTER MANAGEMENT SDN, BERHAD, a Company Incorporated in Malaysia, of Na 152, Jalan Ambang, Kuala Lumpur, Peninsular Malaysia, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-
- 5 This invention relates to a trommel screen for use in the sizing of materials, for example minerals, passed over the screen into undersized and oversized particles.
- 10 One type of apparatus for use in the sizing of materials, especially minerals being handled in mining operations, into undersize and oversize particles comprises a trommel screen. This is a perforated screen of cylindrical or tapered form whose longitudinal axis is usually inclined and which is rotated in use so that mineral material introduced into the upper end thereof executes a substantially helical path along the interior of the screen. As it passes over the perforated screen surface, undersize matter in the mineral material is able to pass through the perforations. The trommel screen may be used to effect grading of mineral material so that the size of the perforations gradually increases along the length thereof. The relatively coarse residual material, after passage over the perforated surface, passes out of the trommel screen at the opposite end to that at which it was originally introduced.
- 15 The trommel screens are generally of simple construction, simply comprising cylindrical metal drums formed with a plurality of perforations or apertures. However, the trommel screens previously manufactured generally do not meet simultaneously all of three basic requirements imposed thereon, that is screen strength, efficient screening and wear resistance. In particular, the abrasive nature of the material being
- screened is such as to give the screens generally employed a limited life before they must be replaced. The screens are made usually of high carbon steel, although they may also be made of mild steel. Moreover efficient screening tends to decrease with time owing to blinding of the apertures by mineral material which becomes wedged therein. Any work carried out to free the apertures of mineral material is extremely time consuming. The conventional steel screens however, at least, possess good strength.
- 20 Because of the bulk of the material being handled, as for example in tin dredging, trommel screens are generally of large size comprising a plurality, usually from seven to thirteen, sequentially arranged bays. The bays are defined by the basic construction of the trommel screens which generally comprises a skeleton framework formed of a plurality of longitudinals, usually eight longitudinals, equally spaced around the screen circumference and spanning between a pair of screen "dead ends" to which cast steel pathways for supply of material to and removal of unscreened material from the trommel are attached, one at each end. The "longitudinals" are generally prefabricated by riveting together of component parts although they sometimes comprise "I" beams or joist sections. Circumferential T" or "I" sections which serve as stiffening hoops to encompass the longitudinal structural members are equispaced around the longitudinal structural members between the screen dead ends to provide the aforesaid plurality of "bays" which are of equal size. The "skeleton" framework and screen dead ends are usually fabricated on site by riveting, or possibly welding. The life of this supporting framework is usually eight to ten years.
- 25 High carbon perforated steel plates are laid over the spaces between the component
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members of the skeleton framework. For a skeleton framework providing seven to thirteen equal bays, there will thus be from 56 to 104 of these steel plates. Each plate is normally attached by 14 to 16 bolts and hence the number of bolt attachments can number from 784 to 1,664 per trommel screen. The construction of a trommel screen in this matter is thus an extremely time consuming matter and to compensate for this, it is desirable that a trommel screen have as long a life as possible.

The perforated plates can impart considerable structural rigidity to the trommel screen, provided that the bolts are maintained in a fully tightened condition. Having regard to the manner of operation of a trommel screen, it will be seen that constant maintenance is required to check that the bolts are maintained in such a condition. Longitudinally extending and circumferentially extending mild steel flat butt straps are attached to the trommel screen at the intersections of the perforated plates using some of the bolts which attach the perforated plates to the supporting skeleton framework. Non-perforated, high carbon wear plates are also attached within the "dead end" shells forming first and last bays to provide an internal surface running on from the inner face of the perforated plates.

According to the present invention, there is provided a trommel screen which comprises a metal backing drum adapted at its ends for attachment to means for effecting the rotation thereof and a replaceable moulded liner plate formed of an elastomeric material emplaced.

Within the backing drum to enter into intimate contact therewith, the backing drum and liner plate being connected one to the other, and the backing drum and liner plate both being formed with apertures in alignment with one another, the apertures in the liner plate being smaller than the apertures in the backing drum aligned with respect thereto.

A trommel screen according to the invention meets the three aforesaid requirements imposed on trommel screens: the metal backing drum, also referred to herein as the drum support, provides the required structural strength for enabling the trommel screen to extend and operate safely between roller path supports provided at each end of the screen for achieving rotation of the screen. The metal backing drum will be a permanent feature of an installation since it will not be subject to wear or to blinding. Hence it may be made of mild steel rather than high carbon steel. The liner plate which will usually be formed of rubber will meet the efficient screening and wear resistance requirements. In addition to providing the basic structural strength of the trommel

screen, the metal backing drum will also provide support and anchorage position for the liner plate. Because of the support provided by the metal backing drum for the liner plate, it is not necessary for the liner plate to be reinforced, as for example by the inclusion of moulded-in components such as are used in flat vibratory grading screens for minerals, as described for example in U.K. Patent Specifications Nos. 1,404,303 and 1,446,684.

Although reference has been made herein simply to the provision of a "liner plate" on a drum support, in practice the drum support will be lined with a plurality of liner plate elements which together provide the required lining. Such a construction will be based upon the traditional form of trommel screen comprising a skeleton framework formed of longitudinals and circumferential "T" or "I" sections as aforesaid having a plurality of bays each of which comprises a plurality, usually eight, perforated steel plates spanning the spaces defined by the structural members of the skeleton at that bay. The perforated steel plates now form a permanent part of the structure and it is for this reason that they may be formed of mild steel and moreover may be riveted to the skeleton framework thereby simplifying the construction of the trommel screen. Each of the perforated steel plates will then have an associated liner plate element so that the plurality of liner plate elements which will be provided will make up the required lining. Each liner plate element will usually be formed as a flattened structure and advantage of its flexibility will be taken to flex it to the curvature of the interior of the drum support formed by the perforated steel plates when forming the trommel screen. This action puts the inner face of the liner plate into compression and provides greater resistance to tearing.

Whilst the liner plate or liner plate elements may have a smooth surface to provide the interior of the trommel screen with a smooth inner surface, it is preferred that at least one moulded-in lifter bar profiled to facilitate lifting and tumbling of the material being screened be provided. The lifter bar(s) will usually be of elongate form disposed parallel to the longitudinal axis of the screen, although a lifter bar may possess a different orientation if desired. With the usual construction of trommel screen formed from a plurality of segmented bays, the lifter bars will generally be provided at the longitudinally extending margins of the liner elements. Such positioning of the lifter bars also enables them then to be used to obtain improved anchorage facilities for attaching a liner plate to the metal backing drum. Annularly disposed lifter bars may also be provided around the interior of the

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trommel screen to provide identical anchorage facilities and allow equal fixing strengths in both the longitudinal and circumferential directions to be obtained. However, the main tumbling action is produced by the longitudinally directed lifter bars.

Whereas the apertures in conventional trommel screens formed entirely of metal are usually round, it is convenient for the purposes of this invention for the apertures in the liner plate or liner plate elements to be disposed in regular arrays preferably being square or rectangular and disposed in square or rectangular arrays, the respective arrays being disposed over apertures in the backing drum of like form and substantially the same area as the associated array in the liner plate or liner plate element.

A moulded liner of a trommel screen according to this invention is non-blinding. This characteristic may be imparted by the resilience thereof which is such as to allow particles whose size substantially exactly matches the size of the apertures to pass therethrough.

Although in principle, the liner plate or liner plate elements may be attached to the backing drum by bolts, in particular bolts employed for attaching perforated steel plates of a drum support to a skeleton framework, in practice it is not found to be expedient to employ this time consuming method of constructing the drum support involving, as aforesaid, for a typical trommel screen the use of from 784 to 1,664 bolts per screen and for which reason the perforated steel plates are preferably riveted to the skeleton framework. In fact, a much more convenient fixing is achieved if raised head screws are disposed at intervals over the interior surface of the backing drum as permanent features thereof and the liner plate or plate elements is/are formed at corresponding locations with fixing apertures or recesses to fit over the screw heads by press-fitting. The provision by moulding of apertures extending through the liner plate or liner plate elements towards the backing drum readily allows fixing of the liner plate or plate elements to the screw head of the backing drum by press-fitting owing to the increased flexibility of the liner plate or plate elements at the recesses as a result of the reduced thickness thereof. Such fixing can be achieved reliably without risk of tearing the liner plate or plate elements. The term "raised head" is used herein to denote any screw whose head projects from the inner surface of the backing drum, preferably a round-headed screw and more preferably a so-called mushroom-headed screw. However, even countersunk screws may be used provided that their heads remain proud of the backing drum.

The fixing of a liner plate or liner plate

element in position becomes a rapid operation when effected in this manner. In contrast, if a corresponding number of nuts and bolts had to be provided, even if the number would be smaller other than that utilised previously in attaching perforated steel plates to a skeleton framework of a trommel screen, the fixing of the liner plate to the backing drum will still be a very time consuming operation. The same consideration applied to the removal of a worn liner plate or liner plate element and its subsequent replacement. With a trommel screen assembled in aforesaid manner, a worn liner plate or liner plate element may be simply prised off from the screw heads of the drum support using a crowbar.

Particularly when individual liner plate elements are employed provided with a lifter bar profile around the periphery thereof as aforesaid, each liner plate element may incorporate an edge channel to allow for accommodation of a resilient sealing element in the passage then formed between two liner plate elements, which passage is preferably formed by two semi-circular edge profiles. Such a seal is desirably provided to prevent material being handled by the drum from being able to pass between the liner plate elements to scour the drum support. However, if close butting of the liner plate elements can be effected, such a seal may be dispensed with. Undue scour of the structural frame may be limited by use of a flexible filler between joints in the perforated steel plate which coincide with joints between the rubber liner plate elements.

In general, not all the liner plate elements will be formed with apertures. Whilst the need for a complete lining of the support drum will generally always remain, it will often not be desirable for practical reasons to carry out screening at all positions along the length of the trommel screen, for which reason screen "dead ends" will generally be present at the beginning and end of the trommel screen and perhaps at intermediate position at which the screen is supported. Hence, among a plurality of liner plate elements provided in a trommel screen embodying this invention will generally be found liner elements formed without apertures to be located at such positions.

Although trommel screens for use in tin dredging generally comprise apertures of the same size throughout, trommel screens or rotary screening drums as they are also known may also be constructed in accordance with this invention which have a grading function. For this purpose, the size of the apertures in the liner plate will increase from the entry end thereof, with corresponding increases where necessary being made in the size of the apertures in the backing drum.

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For a better understanding of this invention and to show how the same may be carried into effect, reference will now be made, by way of example only, to the drawings accompanying the provisional specification and to the accompanying Figure 8 in which:-

Figure 1 shows in elevation a trommel screen embodying this invention;

Figure 1a is a transverse cross-section through the trommel screen of Figure 1 at A-A;

Figure 2 is a plan view of a liner plate element of a trommel screen embodying this invention;

Figure 3 is a plan view of a drum support element of a trommel screen embodying this invention;

Figure 4 is a longitudinal section through an assembly of a liner plate element on a drum support element in a marginal region thereof;

Figure 5 is a transverse cross-section through an assembly of liner plate elements on drum support elements in the region of a flange connection between the drum support elements;

Figure 6 is a cross-section through a combination of liner plate element and drum support element in marginal region thereof showing the manner of interconnection there-between;

Figure 7 shows, on an enlarged scale, partly in transverse cross-section and partly in elevation a detail of an assembled trommel screen according to this invention; and

Figure 8 is a similar view to Figure 6 showing use of an alternative form of holding screw.

Referring to Figures 1 and 1a of the drawings, the trommel screen shown therein is formed of a skeleton framework formed of eight pairs of longitudinally extending members ("longitudinals") 100 equispaced around the screen circumference disposed back to back, the individual members of each pair being connected together by riveting. The longitudinals 100 extend between a pair of screen "dead ends" 101 at which the screen is attached by means (not shown), in use, to an arrangement for effecting the rotation thereof. Circumferential "T" or "I" stiffening hoops 102 extend around the longitudinals 100, being equally spaced between the screen dead ends 101 and dividing the skeleton framework thus formed into a number of equally sized bays between the screen dead ends which themselves may be termed initial and terminal bays of the arrangement. Moreover, the longitudinals divide the trommel screen into eight longitudinally extending segments given the reference letters a to h in Figure 1a. As can be seen more clearly from Figure 1a, the trommel screen further comprises a liner

plate 1 formed of rubber and a mild steel support drum 2. Both the liner plate 1 and support drum 2 are each made up of cylindrical elements corresponding in their dimensions to dimensions of a bay as shown in Figure 1. Thus, overall, the liner plate 1 and support drum 2 can be considered to be made up of cylindrical elements positioned end to end each element in turn being formed of eight segments in accordance with the octants a to h shown in Figure 1a.

Turning next to Figure 2, a liner plate element which is shown curved in Figure 1a to conform to the curvature of the inner surface of the drum support, comprises a thickened marginal region 4 and a thinner central region 5 which is formed with a plurality of arrays 6 of small rectangular apertures 7 which in the illustrated embodiment are so dimensioned that when arranged in a 5 x 3 array form a square array. Around the thickened margin of the liner plate element are provided a plurality of fixing apertures 8 whose function will be described hereinafter.

Although the drum support elements are curved *per se*, for convenience, in particular in allowing correlation with Figure 2, the plan view thereof shown in Figure 3 indicates a flat conformation for the drum support element shown therein. The drum support element comprises a plurality of square apertures 9 positioned in similar manner to the arrays 6 of apertures 7 in Figure 2 and having similar dimensions to the outer dimensions of the arrays of apertures 7. Around the periphery of the drum support element which may be formed of mild steel are provided apertures 10 which are positioned to form continuations of apertures 8 in the liner plate elements when the liner plate elements are placed over corresponding drum support elements. Between the apertures 10 are located further differently dimensioned apertures 11 at which riveting of the drum support elements to longitudinals 100 or circumferential "T" or "I" sections forming stiffening hoops 102 (Figure 1) is effected.

The sections through the juxtaposed liner plate elements and drum support elements shown in Figures 4 and 5, which sections are taken at right angles to each other, indicate more clearly than can be seen from Figure 2 the formation of increased thickness marginal regions 4 around the periphery of the liner panel elements for serving as lifter bars to ensure improved tumbling action within the trommel screen formed from the various elements. In addition, the apertures 8 in the thickened marginal regions 4 can be seen to comprise a narrow section 12 adjacent the surface of the drum support element 1 opening out into a wider section 13 facing the interior of the trommel screen. The edge

surfaces of the liner plate elements which are juxtaposed opposite each other are formed with semi-circular profiles 14 which together form a channel of circular cross-section for accommodating a sealing strip (not shown) for preventing entry of abrasive material the metal surface for causing scouring thereof. The individual aperture 7 in the liner plate element increase in width from the trommel screen interior side of the liner plate element to the side thereof in contact with the drum support element. This coupled with the resilience of the thin walls 15 between the apertures 7 is largely responsible for the absence of any tendency from the plate liner elements to undergo blinding when in use.

Because of the manner in which outermost aperture margins 16 of the liner plate elements are set apart from the peripheral surfaces 17 of the apertures 9 in the drum support elements, it will be appreciated that the area of the apertures 9 is somewhat greater than the area defined by the outer periphery of the arrays 6 of apertures in the liner plate elements.

As can be seen better from Figure 5, the apertures 11 in the drum support elements are occupied by the countersunk heads of rivets 19 which connect the drum support elements to members 20 of longitudinals 100 which are connected together themselves by riveting in positions which are not shown. The drum support elements are connected in this manner to the longitudinals 100 extending lengthwise of the trommel screen and to the circumferential supporting hoops 102 (Figure 1) which extend around the girth of the trommel screen. Thus rows of rivets are provided in two directions at right angles to each other over the outer surface of the trommel screen so as to provide interconnection between the drum support elements and the skeleton framework of the trommel screen. A packing strip 21 is provided between the flange portions 22 of the longitudinal members 20 and the drum support elements 2.

The manner of interconnection of liner plate elements to drum support elements can be best appreciated by reference to Figure 6 in which it can be seen that a mushroom-headed screw is screwed into an aperture 10 in a drum support element with its head 24 spaced apart from what, in use, would be the inner surface of the drum support element. This proud part of the screw 23 is formed with a hole 26 for insertion of a tommy bar to loosen or tighten the attachment screw should it be necessary to replace the screw as a result of damage or due to modification of the shape of the associated part of the liner plate element to be used therewith. A liner plate element is shown fitted on the drum support

element by forcing a wall of the narrow section 12 of an aperture 8 over the head 24 of the screw utilising the resilience of the liner plate element material, so that the underside 27 of the head of the screw comes to abut a shoulder in the aperture 8 where the internal diameters thereof change in stepped manner since the apertures 8 are positioned in marginal regions of the liner plate elements, the removal of liner plate elements from the drum support elements is achieved simply by use of a crowbar.

Referring next to Figure 7 of the drawings, the manner of fixing the main part of the trommel screen skeleton framework, that is that part of the framework defining the perforated or apertured bays, to a cast steel dead end section can be seen. The end stiffening hoop 102 circumferentially defining the shape of the trommel screen is riveted at positions 28 to the dead end section. The packing elements 21 can here be seen to be of rectangular form and not to occupy the entire space between the longitudinals 100 and the drum support elements.

Figure 8 shows a variant of the arrangement shown in Figure 6 in which, in place of the mushroom headed screw 23 whose head is formed with a channel 24, and which does not occupy the entire width of an aperture 8 in a liner plate element, the screw now possesses a mushroom head occupying the entire width of an aperture 8 and being of a more conventional size in not having a channel around its head.

From the foregoing description of the drawings, it will be appreciated that the aforesaid large number of bolts for connecting perforated plats through to a trommel screen skeleton framework, numbering from 784 to 1,664 in typical constructions as aforesaid, may now be dispensed with. When employed in prior art trommel screens, such bolts require removal and replacement when replacing steel perforated plates, as well as periodic tightening. They are not required with a trommel screen of the illustrated type, although a large number of permanent, non-removable mushroom-headed attachment screws are employed for retaining the perforated rubber plate. However, once in place, these mushroom-headed attachment screws will not generally require any attention. The fitting of the liner plate elements is achieved particularly simply by force-fitting over the raised screw heads allowing easy removal of the liner plate elements. As can be seen from Figures 2 and 3, each liner plate elements has fourteen fixing positions. There are eight segments to the trommel screen so that there must then be a total of from 56 to 104 perforated plates. If each plate had fourteen to sixteen attachment bolts for the liner plate element, fitting of

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these would be particularly complex and time consuming procedure which is obviated by the provision of raised head screws over which the liner plate elements may be force-fitted above the relevant apertures provided therein.

WHAT WE CLAIM IS:-

1. A trommel screen for use in the sizing of materials passed over the screen into undersized and oversized particles, the screen comprising a metal backing drum adapted at its ends for attachment to means for effecting rotation thereof and a replaceable moulded liner plate formed of an elastomeric material emplaced within the backing drum to enter into intimate contact therewith, the backing drum and liner plate being connected one to the other and the backing drum and liner plate both being formed with apertures in alignment with one another, the apertures in the liner plate being smaller than the apertures in the backing drum aligned with respect thereto.

2. A trommel screen as claimed in Claim 1, wherein the backing drum is formed of mild steel.

3. A trommel screen as claimed in Claim 1 or 2, wherein the liner plate is formed of rubber.

4. A trommel screen as claimed in any one of the preceding claims which comprises a skeleton framework of cylindrical form comprising a plurality of longitudinally extending members and a plurality of circumferential members dividing the framework into a succession of bays extending in both the circumferential and longitudinal directions, a metal plate formed with a plurality of apertures spanning each bay, being attached to the framework at the margins of the respective bay and each metal plate having an associated liner plate element formed with a plurality of apertures in alignment with and smaller than the apertures in the associated metal plate, the metal plates together forming the backing drum and the liner plate elements together forming the liner plate.

5. A trommel screen as claimed in Claim 4, wherein the longitudinally extending members comprise "I" beams or joist sections.

6. A trommel screen as claimed in Claim 4 or 5, wherein the circumferentially extending members comprise "T" or "I" section members.

7. A trommel screen as claimed in Claim 4, 5 or 6, wherein the liner plate elements are flat elements as manufactured flexed to the curvature to the interior of the backing drum.

8. A trommel screen as claimed in any one of Claims 4 to 7, wherein each liner plate element has an edge channel formed thereon, with resilient sealing elements

being disposed in the passages formed by opposed pairs of edge channels in the liner plate elements.

9. A trommel screen as claimed in any one of the preceding claims, wherein the apertures in the liner plate or liner plate elements are arranged in regular arrays spaced apart thereover and the drum apertures are each of substantially the same area as a said array which is positioned thereover.

10. A trommel screen as claimed in Claim 9, wherein the apertures in the liner plate or liner plate elements are square or rectangular and arranged in square or rectangular arrays over square or rectangular apertures respectively in the backing drum.

11. A trommel screen as claimed in any one of the preceding claims, wherein the liner plate or liner plate elements comprise at least one moulded-in lifter bar profiled to facilitate lifting and tumbling of material being screened.

12. A trommel screen as claimed in Claim 11, wherein one or more said lifter bars extend parallel to the longitudinal axis of the screen.

13. A trommel screen as claimed in Claim 12, which comprises a plurality of said liner plate elements with lifter bars provided at the longitudinally extending margins thereof.

14. A trommel screen as claimed in any one of the preceding claims, wherein the interior surface of the backing drum is provided at intervals with raised head screws and the liner plate or liner plate elements is/are formed at corresponding locations with fixed apertures or recesses fitted over the heads of the screws by press fitting.

15. A trommel screen as claimed in Claim 14, wherein the raised head screws are mushroom headed screws.

16. A trommel screen as claimed in any one of the preceding claims, wherein dead-end sections comprising sections of the liner plate or liner plate elements free from said apertures are provided at the ends thereof.

17. A trommel screen as claimed in any one of the preceding claims, wherein the size of the apertures in the liner plate increases from the entry end of the screen.

18. A trommel screen for use in the sizing of materials passed over the screen into undersized and oversized particles, substantially as hereinbefore described, with reference to, and as shown in, the drawings accompanying the provisional specification.

19. A trommel screen for use in the sizing of materials passed over the screen into undersized and oversized particles, substantially as hereinbefore described, with reference to, and as shown, the draw-

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these would be particularly complex and time consuming procedure which is obviated by the provision of raised head screws over which the liner plate elements may be force-fitted above the relevant apertures provided therein.

WHAT WE CLAIM IS:-

1. A trommel screen for use in the sizing of materials passed over the screen into undersized and oversized particles, the screen comprising a metal backing drum adapted at its ends for attachment to means for effecting rotation thereof and a replaceable moulded liner plate formed of an elastomeric material emplaced within the backing drum to enter into intimate contact therewith, the backing drum and liner plate being connected one to the other and the backing drum and liner plate both being formed with apertures in alignment with one another, the apertures in the liner plate being smaller than the apertures in the backing drum aligned with respect thereto.

2. A trommel screen as claimed in Claim 1, wherein the backing drum is formed of mild steel.

3. A trommel screen as claimed in Claim 1 or 2, wherein the liner plate is formed of rubber.

4. A trommel screen as claimed in any one of the preceding claims which comprises a skeleton framework of cylindrical form comprising a plurality of longitudinally extending members and a plurality of circumferential members dividing the framework into a succession of bays extending in both the circumferential and longitudinal directions, a metal plate formed with a plurality of apertures spanning each bay, being attached to the framework at the margins of the respective bay and each metal plate having an associated liner plate element formed with a plurality of apertures in alignment with and smaller than the apertures in the associated metal plate, the metal plates together forming the backing drum and the liner plate elements together forming the liner plate.

5. A trommel screen as claimed in Claim 4, wherein the longitudinally extending members comprise "I" beams or joist sections.

6. A trommel screen as claimed in Claim 4 or 5, wherein the circumferentially extending members comprise "T" or "I" section members.

7. A trommel screen as claimed in Claim 4, 5 or 6, wherein the liner plate elements are flat elements as manufactured flexed to the curvature to the interior of the backing drum.

8. A trommel screen as claimed in any one of Claims 4 to 7, wherein each liner plate element has an edge channel formed thereon, with resilient sealing elements

being disposed in the passages formed by opposed pairs of edge channels in the liner plate elements.

9. A trommel screen as claimed in any one of the preceding claims, wherein the apertures in the liner plate or liner plate elements are arranged in regular arrays spaced apart thereover and the drum apertures are each of substantially the same area as a said array which is positioned thereover.

10. A trommel screen as claimed in Claim 9, wherein the apertures in the liner plate or liner plate elements are square or rectangular and arranged in square or rectangular arrays over square or rectangular apertures respectively in the backing drum.

11. A trommel screen as claimed in any one of the preceding claims, wherein the liner plate or liner plate elements comprise at least one moulded-in lifter bar profiled to facilitate lifting and tumbling of material being screened.

12. A trommel screen as claimed in Claim 11, wherein one or more said lifter bars extend parallel to the longitudinal axis of the screen.

13. A trommel screen as claimed in Claim 12, which comprises a plurality of said liner plate elements with lifter bars provided at the longitudinally extending margins thereof.

14. A trommel screen as claimed in any one of the preceding claims, wherein the interior surface of the backing drum is provided at intervals with raised head screws and the liner plate or liner plate elements is/are formed at corresponding locations with fixed apertures or recesses fitted over the heads of the screws by press fitting.

15. A trommel screen as claimed in Claim 14, wherein the raised head screws are mushroom headed screws.

16. A trommel screen as claimed in any one of the preceding claims, wherein dead-end sections comprising sections of the liner plate or liner plate elements free from said apertures are provided at the ends thereof.

17. A trommel screen as claimed in any one of the preceding claims, wherein the size of the apertures in the liner plate increases from the entry end of the screen.

18. A trommel screen for use in the sizing of materials passed over the screen into undersized and oversized particles, substantially as hereinbefore described, with reference to, and as shown in, the drawings accompanying the provisional specification.

19. A trommel screen for use in the sizing of materials passed over the screen into undersized and oversized particles, substantially as hereinbefore described, with reference to, and as shown, the draw-

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ings accompanying the provisional specification modified by the accompanying Figure 8.

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