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Víztelenítő szita és eljárás víztelenítő szita gyártására

Az európai szabadalom ellen, megadásának az Európai Szabadalmi Közlönyben való meghirdetésétől számított kilenc hónapon belül, felszólalást lehet benyújtani az Európai Szabadalmi Hivatalnál. (Európai Szabadalmi Egyezmény 99. cikk(1))

A fordítást a szabadalmat az 1995. évi XXXIII. törvény 84/H. §-a szerint nyújtotta be. A fordítás tartalmi helyességét a Szellemi Tulajdon Nemzeti Hivatala nem vizsgálta.

DEWATERING SCREEN AND METHOD FOR MANUFACTURING A DEWATERING SCREEN

The present invention relates to a dewatering screen for manufacturing paper having at least one security feature. The present invention also relates to a method for manufacturing such a dewatering screen and a method for manufacturing paper having a security feature using such a dewatering screen.

In manufacturing paper on cylinder mold machines or Fourdrinier machines, paper pulp continuously accretes on a moving dewatering screen and is solidified to the extent that it can be removed from the dewatering screen as a wet paper web for further processing. For protection, especially security papers for banknotes, identification documents and the like are often furnished with watermarks or through holes that permit the authenticity of the security paper to be verified, and that simultaneously serve as protection against unauthorized reproduction.

Here, security features introduced at paper manufacture exhibit typical characteristics. For instance, through openings that are produced at paper manufacture include, in the edge region, characteristic irregularities that are produced by irregular accretion of fibers in the edge region and by individual fibers protruding into the opening, as described, for example, in publication WO 03/054297.

If sharply edged holes are to be produced in a paper, then a separate laser cutting or punching step is required for this, which, besides greater outlay for the additional work step, also leads to register variations between the security features produced with papermaking technology and the features produced by laser cutting or punching.

In DE 10 2006 058 513 A1 is disclosed a dewatering screen for manufacturing paper having multi-level watermarks, having a carrier mold that comprises, in a sub-region, a multi-level relief in the form of the watermark to be produced. The multi-level relief is formed by an injection-molded, perforated watermark insert.

Proceeding from this, it is the object of the present invention to create a dewatering screen of the kind cited above that avoids the disadvantages of the background art. In particular, the dewatering screen is intended to permit easy manufacture of paper having security features, and ideally enable a registered combination of security features having different visual appearances.

This object is solved by the features of the independent claims. Developments of the present invention are the subject of the dependent claims.

According to the present invention, a dewatering screen includes, for the manufacture of paper having at least one security feature,

- a carrier mold that includes a wire cloth having an insert region,
- arranged in the insert region of the wire cloth, an insert element for producing the at least one security feature in the paper, and
- a plastic overmolding or plastic back molding of the insert element that connects the insert element with the carrier mold.

The security features produced within the scope of the present invention comprise especially watermarks, sharply edged holes in the paper and holes having characteristic irregularities in the edge region. The dewatering screen is particularly advantageously designed to produce in the paper multiple security features, which can each have a different visual appearance, but nevertheless are in register with each other due to the

simultaneous production at paper manufacture and the very good registration tolerances in overmolding or back molding. Multiple security features can especially be related to each other or complement each other. For example, a first security feature can repeat the shape or design of a second security feature or complement it to form a complete piece of information.

As explained in greater detail below, to produce such security features, due to the plastic overmolding or plastic back molding according to the present invention, a plurality of different insert elements can be integrated into a carrier mold, especially also such insert elements that, due to their material characteristics or their shape, do not permit integration into the desired carrier mold with conventional techniques. The present invention thus offers particular advantages for example in the cases in which the wire cloth of the carrier mold and the insert element consist of different materials. For example, the wire cloth and the insert element can consist of different metals, such as with a bronze wire cloth and an insert element composed of steel. In other advantageous embodiments, the carrier mold can consist of metal and the insert element of plastic, or conversely, the carrier mold can consist of plastic and the insert element of metal.

In an advantageous variant of the present invention, the insert element comprises a mold element whose material and/or mesh size differs from the wire cloth of the carrier mold. Here, the mold element can especially be embossed. In one particularly advantageous embodiment, the wire cloth of the carrier mold is a pure plastic cloth, while the mold element comprises a bronze mold, especially an embossed bronze mold. In this way, an embossing can easily be integrated into an otherwise non-embossable plastic wire cloth.

In a further, likewise advantageous variant of the present invention, the insert element comprises an E-type or a watermark insert, especially a tapered E-type or a multi-level watermark insert. Such insert elements can advantageously be formed from steel. Insert elements, for example composed of steel, cannot easily be connected with a common bronze wire cloth with conventional techniques. The present invention remedies this and permits the advantageous characteristics of a bronze carrier mold and of E-types or watermark inserts composed of steel to be combined with each other.

According to a further, likewise advantageous variant of the present invention, the insert element comprises a sharp frame, for example a sharp steel frame, for producing a sharply edged hole in the paper. Unlike with conventional methods, such a dewatering screen permits sharply edged holes to be produced already at paper manufacture. In this way, not only is a separate work step, such as a laser cutting or punching step, saved, but due to the joint manufacture, the sharply edged holes can also be combined in perfect register with other papermaking security features, especially with watermarks and/or holes having characteristic irregularities in the edge region.

In advantageous embodiments, the insert element comprises a metal platelet and/or a plastic platelet, especially composed of water-repellent plastic. A plastic platelet composed of water-repellent plastic can be arranged, for example, in the interior of an above-mentioned sharp steel frame to support the hole formation.

Depending on the desired design, it can be appropriate if the metal platelet or the plastic platelet is provided with a plurality of perforations whose dimensions are preferably so small that no fibers stick in them at paper manufacture. For example, a thinned paper region can be produced by a bronze platelet having a reduced perforation density. The metal or plastic platelet can also be unperforated, for instance when it is to support the hole formation.

The carrier mold of the dewatering screen can also include a magnet element with which magnetic fibers and/or magnetic additives in the pulp can be influenced during sheet formation. For example, magnetic fibers can be aligned along the magnetic field lines of the magnet element and be fixed in their aligned orientation at drying to create a security feature in the form of a magnetic sub-region in the paper. The magnet element can also lead to a targeted accumulation or depletion of magnetic additives in certain paper regions.

Here, the magnet element can advantageously be included in the insert element, for example in the form of a perforated permanent magnet. Alternatively or additionally, the magnet element can also be formed by magnetic additives in the plastic overmolding or the plastic back molding. The magnet element can also be arranged on shot threads. Finally, it is also possible to not integrate the magnet element in the uppermost screen deck of the carrier mold, but to arrange it, for example, within the cylinder mold. What is essential is merely that the magnetic field of the magnet element has sufficient strength in the region of the first screen deck to influence the magnetic fibers or the magnetic additives in the pulp at sheet formation.

According to one development of the present invention, the plastic overmolding or the plastic back molding comprises a surface relief for producing a bi- or multi-level watermark in the paper. Since the overmolding or back molding normally runs around the insert element, this makes it possible to combine the security features produced by the insert element itself with a further security feature in the form of a bi- or multi-level frame watermark.

In all embodiments, the plastic overmolding or the plastic back molding can be provided with a plurality of perforations whose dimensions are preferably so small that no fibers stick in them at paper manufacture.

The insert region can especially be formed by a cut-out sub-region of the wire cloth.

Advantageously, two or more of the specific embodiments described are combined in one insert element to simultaneously produce, at paper manufacture, multiple security features that are in very good or even perfect register with each other.

The present invention also includes a method for manufacturing a dewatering screen for manufacturing paper, in which

- a carrier mold is provided that includes a wire cloth having an insert region,
- in the insert region of the wire cloth is arranged an insert element for producing at least one security feature in the paper, and
- the insert element is overmolded or back-molded with plastic to connect the insert element with the carrier mold.

In this method, the plastic overmolding or the plastic back molding is preferably provided with a plurality of perforations whose dimensions are so small that no fibers stick in them at paper manufacture. Here, the perforations can be produced by means of laser beam, preferably by means of infrared laser.

Finally, the present invention also includes a method for manufacturing a paper having at least one security feature, in which the paper accretion occurs on a dewatering screen of the kind described.

In one advantageous method variant, a sharply edged hole is produced in the paper as the security feature. According to another, likewise advantageous method variant, a hole having characteristic irregularities in the edge region and/or a watermark is produced in the paper as the security feature. A procedure in which a sharply edged hole is produced in the paper as the first security feature, and in which a hole having characteris-

tic irregularities in the edge region and/or a watermark is produced in the paper as the second security feature offers particular advantages, the first and second security feature being in register with each other. Such embodiments are visually attractive due to the combination of different security features and offer high counterfeit security.

Further exemplary embodiments and advantages of the present invention are explained below by reference to the drawings, in which a depiction to scale and proportion was dispensed with in order to improve their clarity.

Shown are:

Fig. 1 a schematic diagram of a banknote having a complex combination of multiple security features,

Fig. 2 in (a), schematically, a cross section through a basic form of a dewatering screen according to the present invention, and in (b), a modification of the basic form in (a),

Fig. 3 a carrier mold having an integrated insert element according to an exemplary embodiment of the present invention,

Fig. 4 a carrier mold having an integrated insert element according to another exemplary embodiment of the present invention,

Fig. 5 a carrier mold having an integrated insert element according to a further exemplary embodiment of the present invention,

Fig. 6 a complex exemplary embodiment having an insert element for the simultaneous production of multiple security features, (a) showing a cross section and (b) a top view of the dewatering screen, and (c) illustrating the visual appearance of the paper formed,

Fig. 7 a dewatering screen having an integrated magnetic insert element, and

Fig. 8 the appearance of a paper produced with the dewatering screen in fig. 7.

The present invention will now be explained using the example of security features for banknotes. For this, fig. 1 shows a schematic diagram of a banknote 10 having a complex combination 12 of multiple security features. The banknote 10 includes a finely structured hole 16 having a sharply delimited edge in the form of a slider that is surrounded by a very thin paper region 15, and said paper region by a high-resolution frame watermark 14. The finely structured hole 16, the thin paper region 15 and the frame watermark 14 have, due to the overmolding or back-molding technology used, very low registration tolerances.

Such complex combinations of security features 14, 15, 16 cannot be produced already at paper manufacture with conventional methods. In particular, the production of a hole having a sharply delimited edge and a fine contour structure, such as the hole 16 in fig. 1, requires a separate work step through laser cutting or punching. Here, relatively high registration tolerances normally result between the hole produced by punching or laser cutting and a watermark produced at paper manufacture. These registration tolerances significantly limit the practically usable watermark/hole design, since the designer must already take the registration tolerances into account when designing the embodiment.

According to the present invention, the security paper of the banknote 10 is manufactured using a dewatering screen that is described in greater detail below, through which both the finely structured hole 16, and the thin paper region 15 and the high-resolution frame watermark 14, can be produced already at paper manufacture and in nearly perfect register with each other.

With reference to fig. 2(a), which shows, schematically, a cross section through a basic form of a dewatering screen according to the present invention, the dewatering screen 20 comprises a carrier mold 22 having a wire cloth 24 that is cut out in a sub-region 30. The wire cloth 24 comprises, in each case, at least one system of interwoven warp threads 26 running lengthwise and weft threads 28 running crosswise thereto. In the context of the present invention, the wire cloth can include, for example, a metal cloth, especially a bronze cloth, a metal-plastic blended cloth, especially a bronze-plastic blended cloth, or also a pure plastic cloth. The carrier mold 22 can include a mono-layer or multi-layer wire cloth, only a mono-layer wire cloth being shown in each case in the drawings for the sake of simpler illustration.

In the cut-out sub-region 30 of the wire cloth 24, an insert element 32 for producing at least one security feature 14, 15, 16 is arranged in the security paper, the insert element 32 being connected with the carrier mold 22 by a plastic overmolding 34. Fig. 2(b) shows a modification of the basic form in fig. 2(a), in which the insert element 32 is connected with the carrier mold 22 by a plastic back molding 36. Due to the overmoldings 34 or back moldings 36 according to the present invention, a plurality of different insert elements 32 can be integrated into the carrier mold 22, especially also such insert elements 32 as do not permit integration with conventional techniques due to the differentness of the materials or due to a particular form or other particular characteristics of the insert element 32.

In some embodiments, it is appropriate if the insert element 32, the plastic overmolding 34 or plastic back molding 36, or also both elements are provided with perforations to ensure dewatering at paper manufacture in said regions. Here, the dimensions of the perforations are chosen to be so small that no fibers stick in them at paper manufacture.

In further embodiments, the wire cloth 24 is not cut out, but rather merely comprises an insert region in which the insert element is arranged. In particular, the wire cloth can continue behind the insert element in overmolding, and in or behind the back molding in back molding.

The drawings below show some specific exemplary embodiments for insert elements that, with conventional methods, are not easily integratable into the carrier mold used.

In the exemplary embodiment in fig. 3, the carrier mold 40 comprises a bronze wire cloth 42. In the cut-out sub-region 30 of the bronze wire cloth 42 is arranged an insert element 44 that includes a steel platelet 46 having a tapered steel E-type 48. The insert element 44 is connected with the carrier mold 40 by a plastic overmolding 34.

A steel insert element 44 having a tapered steel E-type 48 cannot easily be welded onto a bronze wire cloth 42 due to the differentness of the materials. Due to the tapered E-type 48, a connection by means of electric welding fails due to the differentness of the surfaces to be connected. A solder connection of the steel insert elements 44 with the bronze wire cloth 42 would, in principle, be possible, but fine solderings corrode in the acidic environment of the paper pulp, and there exists, moreover, the risk that the meshes of the wire cloth 42 will be closed up by the soldering paste. The same problems occur generally with upwardly tapering steel E-types, such as multi-level E-types, or also in multi-level watermark inserts composed of steel, which cannot easily be connected with the bronze wire cloth 42 with conventional methods, but which can be integrated into the carrier mold by a plastic overmolding 34 or plastic back molding 36 with no trouble.

Fig. 4 shows a further exemplary embodiment in which the carrier mold 40 likewise comprises a bronze wire cloth 42. In a cut-out sub-region 30 of the bronze wire cloth 42 is arranged an insert element 50 that

includes a sharp steel frame 52. With the sharp steel frame 52, a hole 16 having a sharp edge is produced already at paper manufacture, as illustrated, for instance, in fig. 1. The insert element 50 having the steel frame 52 is connected with the carrier mold 40 by a plastic overmolding 34. With conventional methods, the steel frame 52, in contrast, cannot be integrated into the bronze carrier mold 40 for the above-mentioned reasons.

To boost the effect, the insert element can additionally include, within the steel frame, a plastic platelet 54 composed of a water-repellent plastic. Such a measure is appropriate especially when only smallish holes are to be produced with the steel frame 52.

In the exemplary embodiment in fig. 5, the insert element integrated into the carrier mold 60 is formed by a mold element 64 whose material and/or mesh size differs from the wire cloth 62 of the carrier mold 60. For example, the carrier mold 60 can include a pure plastic wire cloth 62, and the mold element 64 can be formed by a bronze mold having an embossing 66 that is connected with the carrier mold 60 by the plastic overmolding 34. In this way, an embossing 66 can nevertheless easily be integrated into a plastic wire cloth 62 that itself is not embossable.

Fig. 6 shows a complex exemplary embodiment in which the insert element 72 of the dewatering screen 70 is designed for the simultaneous production of multiple different security features. Here, fig. 6(a) shows a cross section and fig. 6(b) a top view of the dewatering screen 70. The visual appearance of the paper 90 formed is depicted in fig. 6(c).

With reference first to figures 6(a) and (b), the dewatering screen 70 includes, like the dewatering screen 20 in fig. 2, a carrier mold 22 having a wire cloth 24, composed of bronze, that is cut out in a sub-region 30. In the cut-out sub-region 30 is arranged an insert element 72 that is connected with the carrier mold 22 by a plastic overmolding 80. In this exemplary embodiment, the plastic overmolding 80 comprises a multi-level surface relief 82 and is, moreover, provided with a plurality of perforations to ensure dewatering at sheet formation. Since the plastic overmolding 80 runs around the edge of the insert element 72, it forms a perforated injection-molded frame that, at paper manufacture, due to its multi-level surface relief 82, produces in the paper 90 a multi-level frame watermark 94 that includes the security features produced by the insert element 72, as shown in fig. 6(c).

The insert element 72 itself includes a bronze sheet 74 that is only slightly perforated and that, due to the low perforation density and its smooth surface at paper manufacture, produces a very thin paper region 96. In the interior of the bronze sheet 74, a sharp steel frame 76 is provided for producing a hole 98 having a sharp edge (fig. 6(c)). Here, the steel frame 76 can be dropped down so that it does not come into contact with the dandy roll or the take-up roll.

Within the steel frame 76 is arranged a platelet 78 composed of water-repellent plastic that supports the hole production. The connection between the bronze sheet 74, the steel frame 76 and the plastic platelet 78 can occur, for example, through bonding, welding, clamping or another common method.

With reference to the diagram in fig. 6(c), the paper 90 produced with the dewatering screen 70 displays, outside the frame watermark 94, a vellum region 92 of normal paper thickness. The frame watermark 94 comprises a multi-level design whose appearance is given by the multi-level surface relief 82 of the plastic overmolding 80. Within the frame watermark 94 is located a vellum region 96 of very low paper thickness that is produced by the slightly perforated bronze sheet 74, and within said thin vellum region 96 is arranged a finely structured, sharply edged hole 98 in the form of a slider. According to the present invention, all of these differ-

ent security elements are produced simultaneously at paper manufacture. Their manufacture requires no separate work steps, such as a laser cutting or punching step. Moreover, due to the joint production by the insert element, the security features are in very good register with each other. In particular, there are no register variations between the frame watermark 94 and the sharply edged hole 98, such that the two elements can be aligned with each other as desired.

Due to the inventive overmolding or back molding of insert elements, also magnetic elements can be integrated into a carrier mold. For illustration, fig. 7 shows a dewatering screen 100 having a carrier mold 22 having a cut-out wire cloth 24 in whose cut-out sub-region is arranged, as the insert element, a sickle-shaped permanent magnet 102 that is provided with a plurality of perforations 104. The perforated permanent magnet 102 is connected with the carrier mold 22 by a plastic overmolding 34.

The plurality of perforations 104 ensures dewatering in the region of the permanent magnet 102. Due to the magnetic field of the permanent magnet 102, magnetic components of the pulp are specifically influenced at sheet formation. For example, the pulp can include magnetic fibers that are aligned along the magnetic field lines of the permanent magnet 102 at sheet formation. When drying the paper web, the magnetic fibers are then permanently fixed in their aligned orientation.

Fig. 8 shows a top view of a paper 110 having a magnetic security feature, produced with the dewatering screen 100 in fig. 7. In a sickle-shaped sub-region 112 that, at paper production, was located directly above the permanent magnet 102, magnetic fibers contained in the pulp were aligned, while the magnetic fibers in the surrounding paper region 114 are present in a disordered state. The differing alignments of the magnetic fibers can be detected in the finished paper 110 with, for example, a magnetic sensor.

In other embodiments, the sub-region 112 can also differ visually from the surrounding region 114. For example, the pulp can include magnetic, dyed or fluorescent additives that are attracted or repelled by the permanent magnet 102, such that the concentration of said additives in the sub-region 112 differs from the concentration in the surrounding region 114.

Magnetic elements need not be included in the insert element 32, they can also be formed by magnetic additives in the plastic overmolding 34 or the plastic back molding 36. They also need not be integrated in the uppermost screen deck 24 of the carrier mold 22, but can also be arranged in a lower screen deck or in the interior of the cylinder mold. They can, for example, also be located on shot threads. Magnetic elements can be combined with all previously described embodiments.

List of Reference Numbers

	10	Banknote
	12	Complex security feature
5	14	Frame watermark
	15	Thin paper region
	16	Finely structured hole
	20	Dewatering screen
	22	Carrier mold
10	24	Wire cloth
	26	Warp threads
	28	Weft threads
	30	Cut-out sub-region
	32	Insert element
15	34	Plastic overmolding
	36	Plastic back molding
	40	Carrier mold
	42	Bronze wire cloth
	44	Insert element
20	46	Steel platelet
	48	Steel E-type
	50	Insert element
	52	Sharp steel frame
	54	Plastic platelet
25	60	Carrier mold
	62	Wire cloth
	64	Mold element
	66	Embossing
	70	Dewatering screen
30	72	Insert element
	74	Bronze sheet
	76	Sharp steel frame
	78	Platelet
	80	Plastic overmolding
35	82	Surface relief
	90	Paper
	92	Vellum region of normal paper thickness
	94	Frame watermark
	96	Thin paper region
40	98	Sharply edged hole

	100	Dewatering screen
	102	Permanent magnet
	104	Perforations
	110	Paper
5	112	Sickle-shaped sub-region
	114	Surrounding paper region

VÍZTELENÍTŐ SZITA ÉS ELJÁRÁS VÍZTELENÍTŐ SZITA GYÁRTÁSÁRA

10 Szabadalmi igénypontok

1. Víztelenítő szita (20) legalább egy biztonsági elemmel rendelkező papír gyártásához, amely tartalmaz
 - hordozószitát (22), mely betéttartománnyal rendelkező szitaszövetet (24) foglal magában,
 - a legalább egy biztonsági elem papírban történő előállításához egy a szitaszövet betéttartományában elrendezett betételemet (32), és
- 15 - a betételelem (32) műanyag fröccsöntött befoglaló elemét (34) („Kunststoff-Umspritzung”) vagy műanyag hátoldali fröccsöntött elemét (36) („Kunststoff-Hinterspritzung”), mely a betételemet (32) egyesíti a hordozószitával (22).
2. Az 1. igénypont szerinti víztelenítő szita, **azzal jellemezve**, hogy a hordozószita (22) szitaszöve (24) és a betételelem (32) eltérő anyagokból vannak, különösen a szitaszövet és a betételelem eltérő fémekből vannak vagy a
 20 szitaszövet és a betételelem közül az egyik fémből, a másik műanyagból van.
3. Az 1. vagy a 2. igénypont szerinti víztelenítő szita, **azzal jellemezve**, hogy a betételelemnek (32) anyagát és/vagy lyukbőségét tekintve a hordozószita szitaszövetétől különböző szitaeleme (64) van.
4. A 3. igénypont szerinti víztelenítő szita, **azzal jellemezve**, hogy a szitaelem (64) dombornyomott.
5. A 3. vagy a 4. igénypont szerinti víztelenítő szita, **azzal jellemezve**, hogy a hordozószita (22) szitaszöve (24) tiszta műanyagszövet, továbbá a szitaelem (64) bronzszitát, különösen dombornyomott bronzszitát
 25 tartalmaz.
6. Az 1-5. igénypontok bármelyike szerinti víztelenítő szita, **azzal jellemezve**, hogy a betételelem (32) E-típusú (48) vagy vízjelbetétet, különösen hegyesen végződő E-típusú vagy többszintes vízjelbetétet tartalmaz.
7. Az 1-6. igénypontok bármelyike szerinti víztelenítő szita, **azzal jellemezve**, hogy a betételelemnek (32) a
 30 papírban határozott szélű lyuk (16) képzéséhez hegyes kerete (52) van.
8. Az 1-7. igénypontok bármelyike szerinti víztelenítő szita, **azzal jellemezve**, hogy a betételelem fém lapkát és/vagy műanyag, különösen víztaszító műanyagból lévő lapkát (54) tartalmaz.
9. A 8. igénypont szerinti víztelenítő szita, **azzal jellemezve**, hogy a fém lapka és/vagy műanyag lapka (54) perforációkkal van ellátva, melyek mérete előnyösen olyan kicsi, hogy a papírgyártás során azokba rostok nem
 35 tapadnak bele.

10. Az 1-9. igénypontok bármelyike szerinti víztelenítő szita, **azzal jellemezve**, hogy a hordozószita (22) mágneselemet tartalmaz, a mágneselemet előnyösen a betételem (32), a műanyag fröccsöntött befoglaló elem (34) vagy a műanyag hátoldali fröccsöntött elem (36) tartalmazza vagy a mágneselem beszótt fonalakon van elrendezve.
- 5 11. Az 1-10. igénypontok bármelyike szerinti víztelenítő szita, **azzal jellemezve**, hogy a műanyag fröccsöntött befoglaló elem (34) vagy a műanyag hátoldali fröccsöntött elem (36) a papírban két- vagy többszintes vízjel előállításához felületi reliefet (82) tartalmaz.
12. Az 1-11. igénypontok bármelyike szerinti víztelenítő szita, **azzal jellemezve**, hogy a műanyag fröccsöntött befoglaló elem (34) vagy a műanyag hátoldali fröccsöntött elem (36) perforációkkal van ellátva, melyek mérete
- 10 előnyösen olyan kicsi, hogy a papírgyártás során azokba rostok nem tapadnak bele.
13. Az 1-12. igénypontok bármelyike szerinti víztelenítő szita, **azzal jellemezve**, hogy a betéttartományt a szitaszövet (24) kimetszett résztartománya (30) képezi.
14. Eljárás papírgyártásra szolgáló víztelenítő szita (20) gyártására, amelynél
- betéttartománnyal rendelkező szitaszövetet (24) magában foglaló hordozószitát (22) készítünk,
- 15
- legalább egy biztonsági elem papírban történő előállításához a szitaszövet betéttartományában betételemet (32) rendezünk el, és
 - a betételem (32) hordozószitával (22) való egyesítéséhez a betételemen műanyagfröccsöntéssel befoglaló elemet vagy hátoldali elemet képezünk.
15. A 14. igénypont szerinti eljárás, **azzal jellemezve**, hogy a műanyag fröccsöntött befoglaló elemet (34) vagy
- 20 a műanyag hátoldali fröccsöntött elemet (36) perforációkkal látjuk el, melyek mérete olyan kicsi, hogy a papírgyártás során azokba rostok nem tapadnak bele.
16. A 15. igénypont szerinti eljárás, **azzal jellemezve**, hogy a perforációkat lézernyalábbal, előnyösen infravörös lézernyalábbal állítjuk elő.
17. Eljárás legalább egy biztonsági elemmel rendelkező papír gyártására, amelynél a papírkészítés egy az 1-13.
- 25 igénypontok bármelyike szerinti víztelenítő szitán történik.
18. A 17. igénypont szerinti eljárás, amelynél a papírban biztonsági elemként határozott szélű lyukat (16) állítunk elő.
19. A 17. igénypont szerinti eljárás, amelynél a papírban biztonsági elemként szélső tartományában jellegzetes szabálytalanságokkal rendelkező lyukat (16) és/vagy vízjelet állítunk elő.
- 30 20. A 17. igénypont szerinti eljárás, amelynél a papírban első biztonsági elemként határozott szélű lyukat állítunk elő, továbbá a papírban második biztonsági elemként szélső tartományában jellegzetes szabálytalanságokkal rendelkező lyukat és/vagy vízjelet állítunk elő, ahol az első és a második biztonsági elemek egymással szorosan egymás mellett vannak.

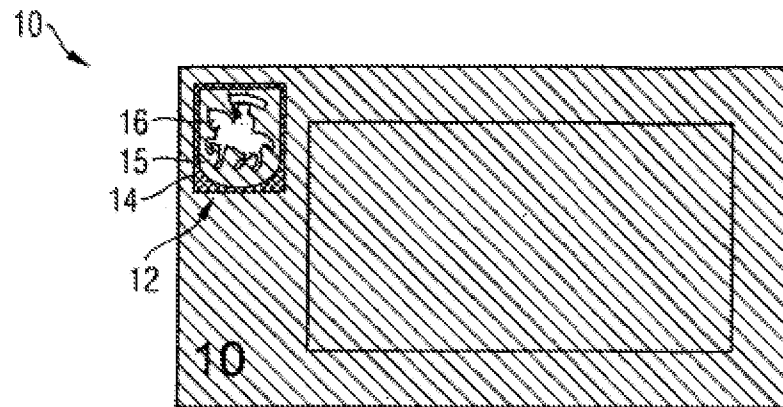


Fig. 1

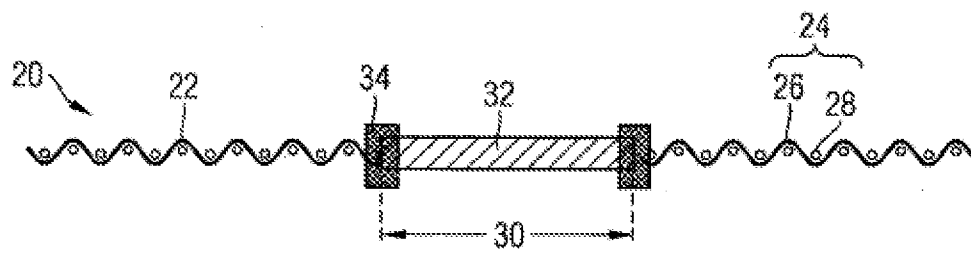


Fig. 2a

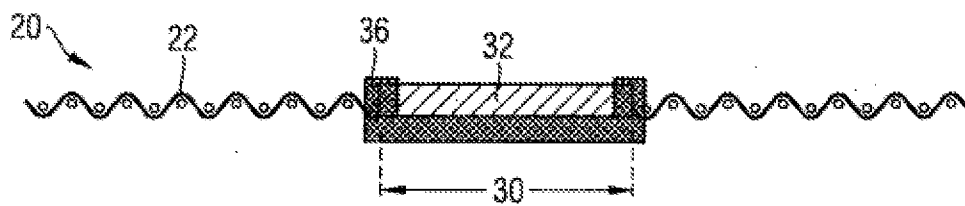


Fig. 2b

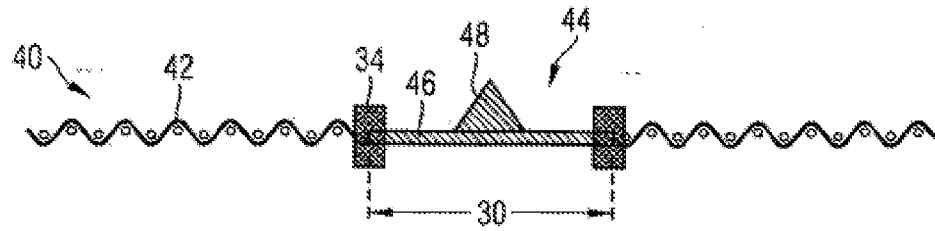


Fig. 3

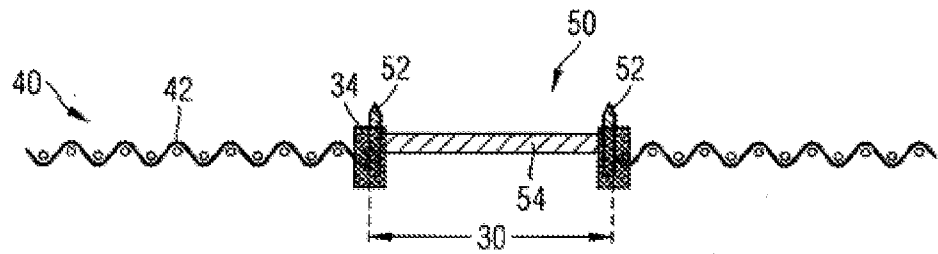


Fig. 4

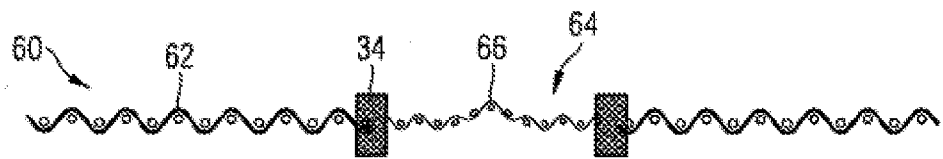


Fig. 5

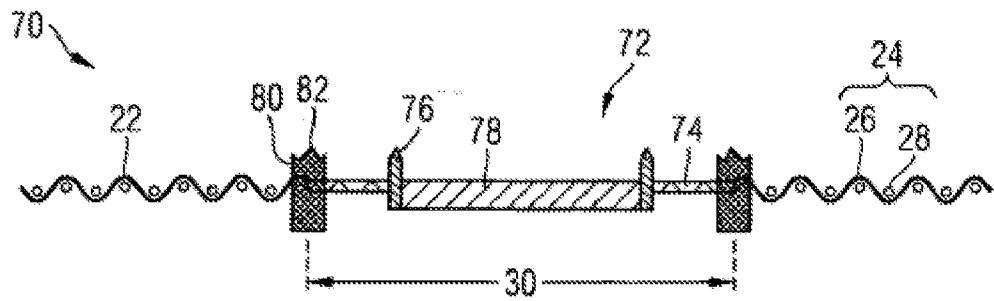


Fig. 6a

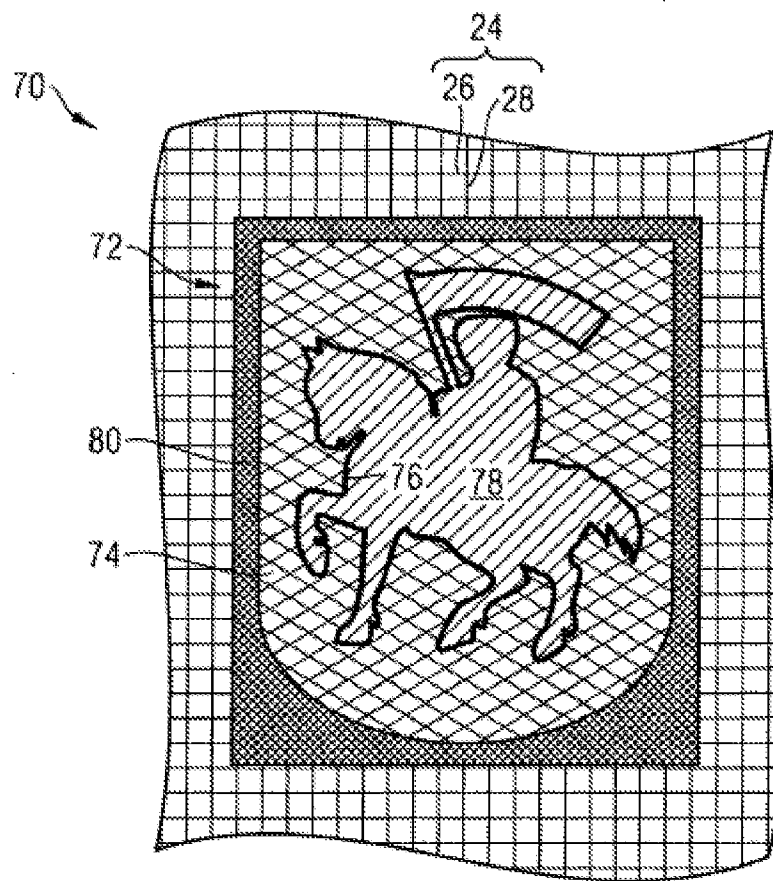


Fig. 6b

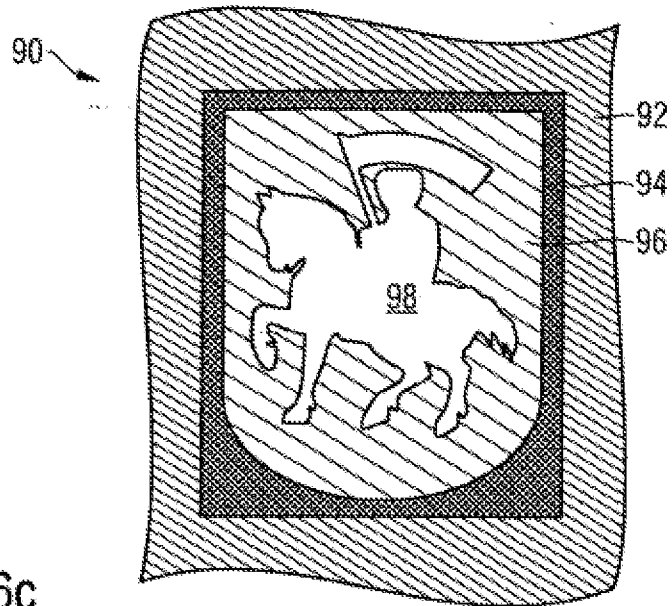


Fig. 6c

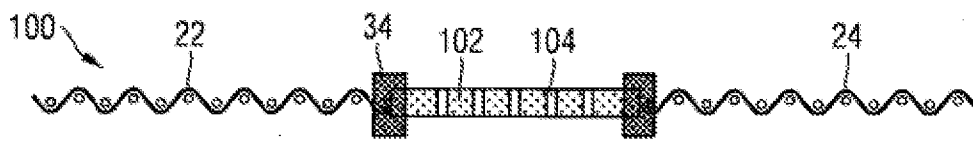


Fig. 7

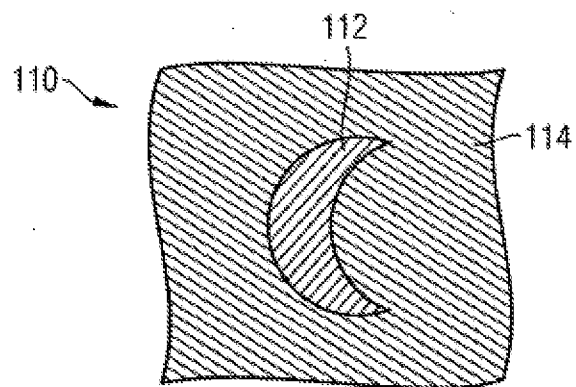


Fig. 8