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(54) TENNIS NET TENSION SYSTEM INCLUDING SERVICE LET INDICATION FEATURE

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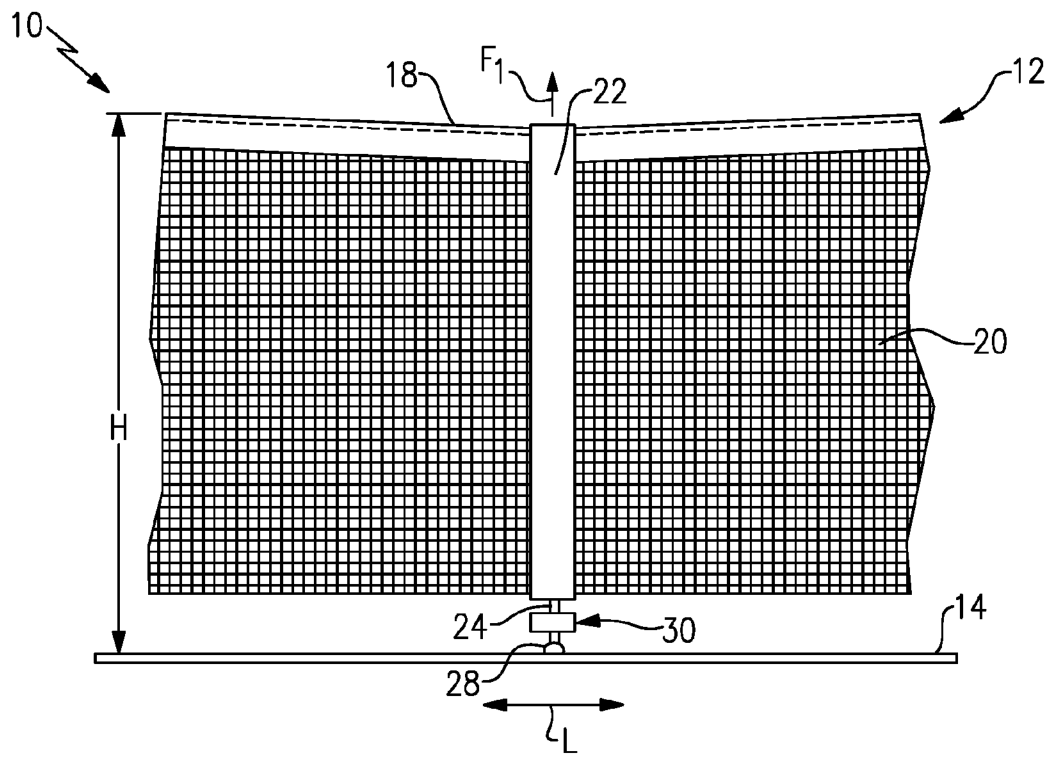
CPC ***A63B 61/04*** (2013.01); ***A63B 61/006*** (2013.01); ***A63B 69/38*** (2013.01)

(57) **ABSTRACT**

Disclosed is system and method for measuring the tension of a tennis net, and, alternatively or in addition, for determining if a service let occurs via the measuring of the net tension. The disclosed embodiments measure a force exerted on the center-strap or the singles stick by the net. In these embodiments, the measured force provides an accurate reflection of the tension of the net.



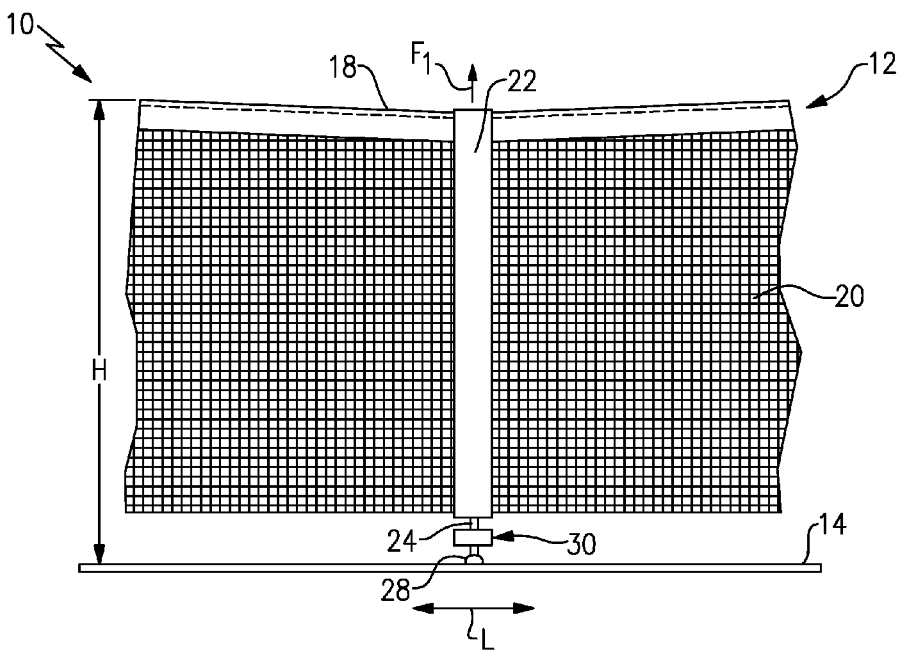


FIG.1

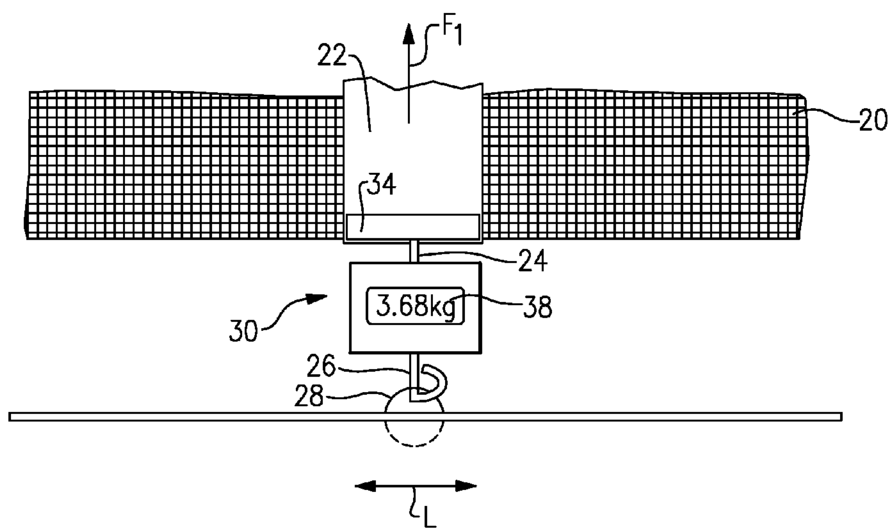


FIG.2

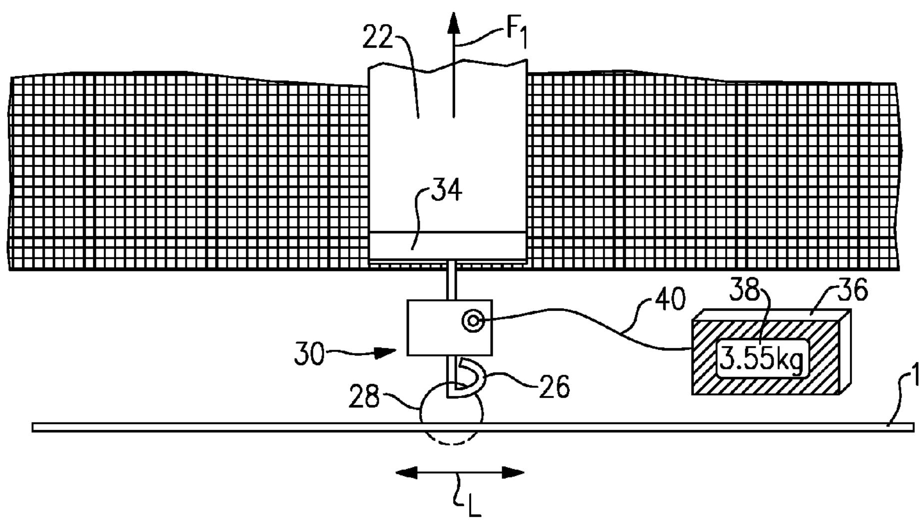


FIG.3a

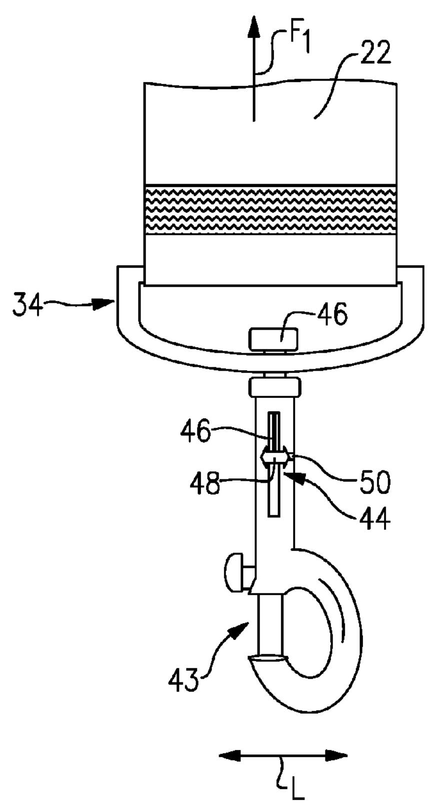


FIG.3b

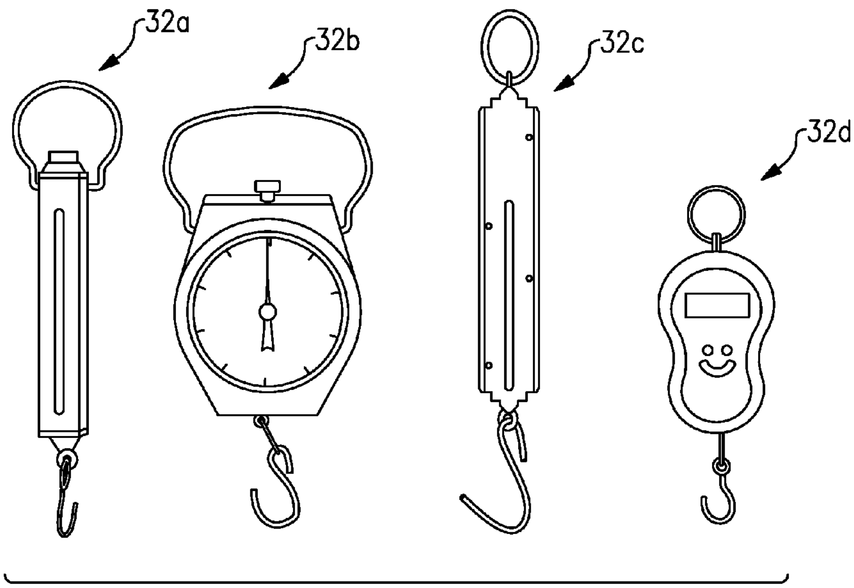


FIG.3c

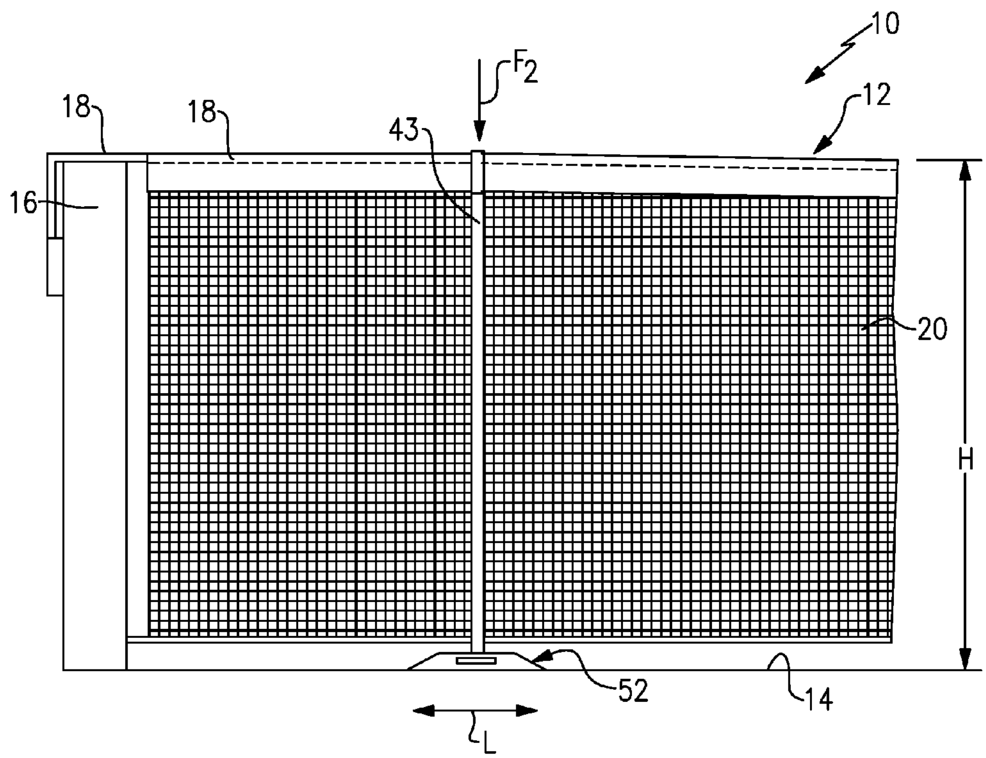


FIG.4

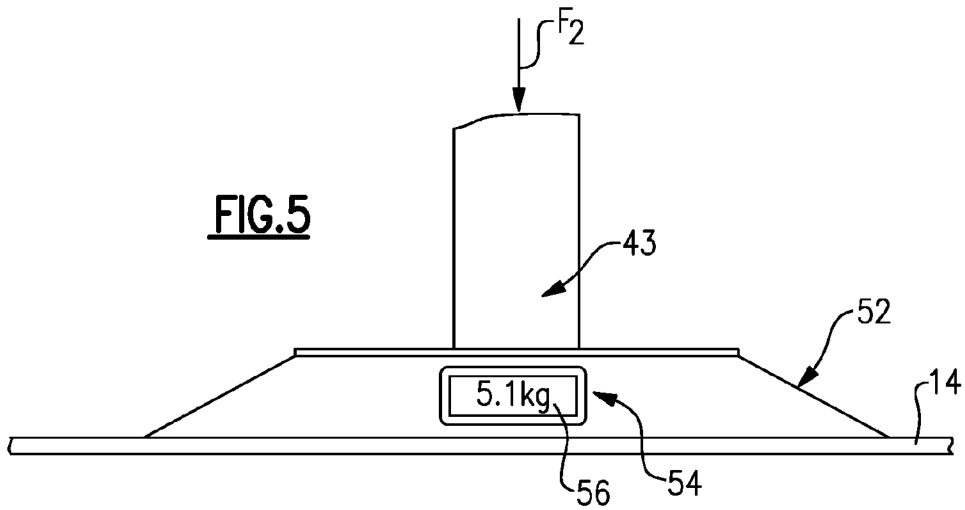


FIG.5

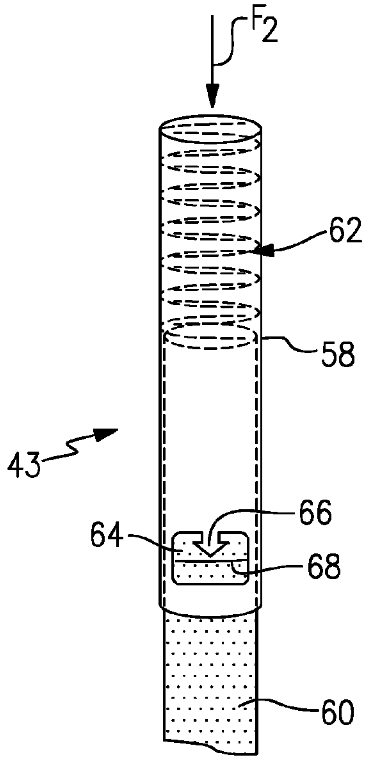


FIG.6a

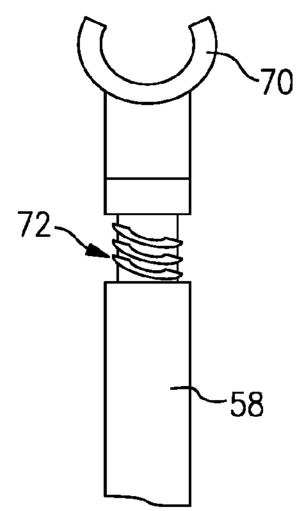


FIG.6b

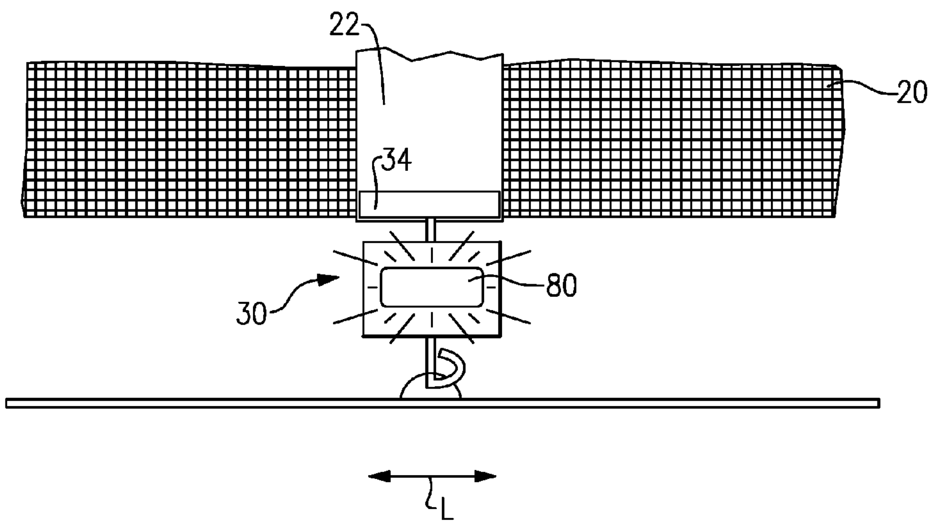


FIG.7

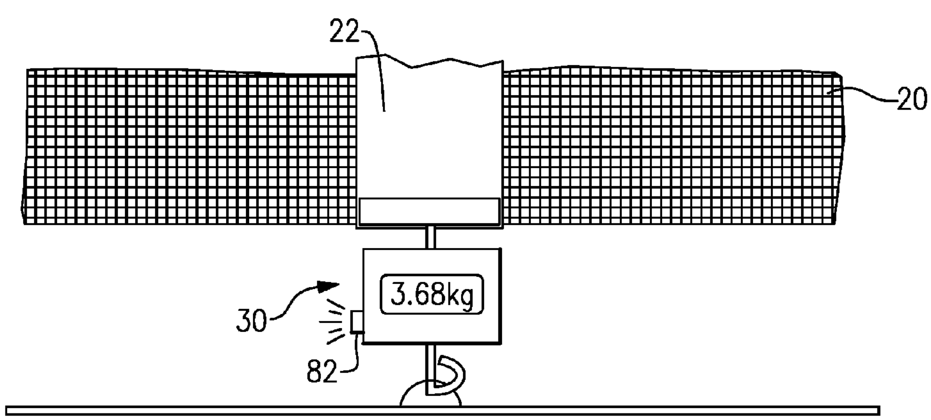


FIG.8

TENNIS NET TENSION SYSTEM INCLUDING SERVICE LET INDICATION FEATURE

RELATED APPLICATIONS

[0001] This application is a continuation-in-part of prior U.S. application Ser. No. 14/646,230, filed May 20, 2015, which is a national stage entry of PCT/US2013/072408, filed Nov. 27, 2013. The '408 PCT Application claims the benefit of U.S. Provisional Application No. 61/730,238, filed Nov. 27, 2012, and U.S. Provisional Application No. 61/737,284, filed Dec. 14, 2012. The entirety of each of these disclosures is herein incorporated by reference.

BACKGROUND

[0002] On all tennis courts, perhaps the most notable part is the net. In one known example, a tennis net includes two main net posts placed at a pre-determined height (e.g., 107 cm), and positioned a distance (e.g., 91.4 cm) outside the outermost (or doubles) sidelines of a tennis court. The net is typically composed of a woven or plastic netting supported by an upper net cable. The netting hangs from a strong metal cable via a white net tape. The net cable is attached to one post and then to the opposite post, which has a crank that winds the cable so that the net tightens and rises up to the required height and a desired tension.

[0003] In the middle of the net, there is a center-strap (also known as a mid-strap) which holds the net down by coming over the top of the net and being fastened to a clasp on the playing surface. This provides greater tension than a crank could practically provide (by pulling down at the mid-point of the net), since cables generally will sag, and provides the defined low part of the net in the center, and at an determinable height, which is an important during play. The result is a semi-V shape running in the top part of the net, where the center strap provides the regulation 91.4 cm height of the net in the middle.

[0004] In many tennis tournaments throughout the world, each net can be different. Wimbledon is known for a loose net while the U.S. Open is known for having a tight highly tensioned net. In fact, because both tournaments are outdoors, the net may be taken down as much as several times on any particular day with inclement weather. From tournament to tournament, and court to court, and even from day to day, and hour to hour, there lacks a precise, uniform net tension in tennis. And with this varying net tension, comes varying net heights (as net height is directly correlated to net tension, as explained further below).

[0005] When net tension is different, balls that clip the very top of the net ("net tape") during a rally will dribble over a loose net (resulting in what is called a cheap point), as a net with a looser tension absorbs the forward movement of the ball, allowing balls which hit the tape to roll over to the other side of the net. Conversely, with a tight net, the ball that clips the net tape will either sit up for an easy put away, or bounce out for a loss of the point, as tighter tensions do not absorb the forward pace and either send balls hitting the tape backward or cause the ball to change trajectory and fly out. This causes inconsistency in playing conditions.

[0006] Additionally, as mentioned, when net tension is different, the height of the net will be different. This is despite the fact that the net post is a defined height, as is the center-strap (107 cm and 91.4 cm respectively). The net traverses the court typically at 12.8 m in length (or 10.97 m for a singles net post). The net itself weighs approximately 10 kg (alternately approximately twice that for the ATP World Tour nets). Therefore, there will be a measurable sag in the net even when it is cranked up to reach the center-strap 91.4 cm height. The more one cranks thereafter, the tighter the net, thus as the net tension increases, the sag between the net posts/singles sticks and the center-strap will lessen, as the net cable will straighten out while being pulled tighter (resulting in different heights between those two points). This non-measured cranking (done essentially by "feel") can result in not only an inconsistent net tension but also an inconsistent net height. While the height of a net is the same for players on both sides, a player with more top spin will have an advantage over a player who hits a flatter ball when the net height can vary as much as several millimeters over the most of the playing area of the net (and as much as 1 cm at the midpoint between the singles stick and center-strap where the sag is greatest). Further, players who prefer to hit down the line (as opposed to cross court) will have a lower/higher net height at precisely that part of the net, with potentially different results of any such shot, depending upon the net tension. As the court itself has strictly defined dimensions and measurements in millimeters, as determined by the tennis governing bodies, and thus define the height of the net at any given point by virtue of knowing (and creating) the net tension.

[0007] For serves, the current rules call for a "service let," which is when the ball clips the net and still falls inside the service box. Loose nets will likely result in more lets while tight nets more likely cause the ball to either bounce back, sit up, or fly further and thus out (a "fault"). Professional tennis had recently considered removing the "service let." Should this still happen in the future, more "aces" will occur with loose nets (as the ball dribbles over to the other side) while tight nets will cause more balls to sit up for easy winners by the opponent or will go fly out for a loss of the point. The result is different depending upon the net tension. This is unacceptable, as the effect can be different on different courts and even change on the same court on the same day when the net often needs to be taken down on outdoor courts during rain, or to change nets during events with different tours (which have different nets). The result is an ever varying net tension and height for virtually each time a net is set up.

SUMMARY

[0008] There is a need for consistency in net tension across tennis. Disclosed is system and method for measuring the tension of a tennis net, and, alternatively or in addition, for determining if a service let occurs via the measuring of the tension. The disclosed embodiments measure a force exerted by the net on a center-strap or a singles stick. In these embodiments, the measured force provides an accurate reflection of the tension of the net.

[0009] The embodiments, examples and alternatives of the preceding paragraphs, the claims, or the following description and drawings, including any of their various aspects or respective individual features, may be taken independently or in any combination. Features described in connection with one embodiment are applicable to the other embodiments, unless such features are incompatible.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] The drawings can be described as follows:

[0011] FIG. **1** is a view of an example net tension system.

[0012] FIG. **2** is a close-up view of the system of FIG. **1**.

[0013] FIGS. **3**A is a view of another example net tension system.

[0014] FIG. **3**B is a view of yet another example net tension system.

[0015] FIG. **3**C illustrate example pull scales for use in the system of FIGS. **1-3**A.

[0016] FIG. **4** is a view of still another example net tension system.

[0017] FIG. **5** is a close-up view of the example net tension system of FIG. **4**.

[0018] FIGS. **6**A-**6**B show a further example net tension system.

[0019] FIG. **7** shows a further example system. In FIG. **7**, a light is configured to become illuminated to indicate a let has occurred.

[0020] FIG. **8** shows a further example system. In FIG. **8**, a speaker is configured to make a relatively loud sound, such as a beep, to indicate a let has occurred.

DETAILED DESCRIPTION

[0021] FIG. **1** illustrates an example net tension system **10**. The system **10** is used in connection with a net **12**, which spans a playing area **14** in a direction of its length L. The playing area **14** in one example is a tennis court, and the net **12** is a tennis net. This disclosure may be used outside of tennis, however.

[0022] The net **12** is supported on opposite sides of the playing area **14** by net posts **16** (FIG. **4**). The net **12** includes an upper cable **18** (or, "net cable") supporting a mesh (or, netting) **20**. The upper cable **18** spans the distance between the net posts **16**. At least one of the net posts includes a crank (not shown) for adjusting the tension in the upper cable **18**. This tension, in turn, tightens the net **12**. For all intents and purposes, the term net tension describes the tightness of the net, and is directly related to the tension in the upper cable **18**, as well as the force exerted by the net **12** on one or more connectors provided between the net **12** and the playing area **14** (such as the center-strap **22** and the singles stick **43**).

[0023] The net **12** is connected to the playing surface **14**, in this example, by a center-strap **22**. The upper cable **18** exerts an upward force F_1 on the center-strap **22** in a direction substantially perpendicular to the length L of the net **12**. This is because the net **12** is higher at each end (e.g., the net posts **16** are at 107 cm height) than in the middle, so the center-strap **22** necessarily pulls down upon the net **12**, creating the upward force F_1. The center-strap **22** resists the force F_1 with an equal and opposite force to maintain the net **12** in a normal condition (the pre-determined height of the center-strap **22**). The force F_1 is resisted by way of the center-strap **22** being connected to the playing surface **14**. In one example, the center-strap **22** is connected to the playing surface by a cable **24** attached to a first connecting support **26**, which is selectively attachable to a hook **28**.

[0024] In one example of this disclosure, a scale **30** measures the force F_1 exerted by the upper cable **18** on the center-strap. The force F_1 is indicative of a tension in the net **12**. That is, the higher the tension of the upper cable **18**, the higher the force F_1 against the center strap **22**. As used herein, the term "scale" refers to any force measuring device, including, but not limited to pull scales **32**A-**32**D (FIG. **3**A), compression scales, and load cells (such as tension load cells and tension meters). A system **10** solely for determining net tension would work with a standard scale, while a service let indicator (discussed below) may require a faster load cell to obtain speeds high enough to register a ball strike. In the example where the scale **30** is a load cell, such as an electronic load cell, the system **10** may include an amplifier/digitizer and other associated electronic components. The scale may be digital (as in pull scale **32**D), or mechanical (e.g., spring-type, as in pull scales **32**A-**32**C).

[0025] As shown in FIG. **2**, the scale **30** may be attached to the center-strap **22** by a cable **24**, which can be connected to the center-strap **22** via a second connecting support **34**. The first connecting support **26** is connected to the playing surface **14** via the hook **28**, which is typically built-into tennis courts. If desired, an extension of the center-strap **22** can be attached via the first connecting support **26** to hang downwards and hide the scale **30**. Alternatively, the color of the scale **30** may be selected to blend in with the net **12** or playing surface **14**. The scale **30** may be connected to the center-strap **22** in other ways.

[0026] As illustrated in FIG. **2**, the scale **30** may include an indicator **36** expressing the force F_1 measured by the scale **30**. In FIG. **2**, the indicator **36** includes a digital display **38** that graphically expresses the measured force as a numerical quantity. The indicator **36** of FIG. **2** is attached to the scale **30**. In other examples, such as in FIG. **3**A, the indicator **36** is provided separately from the scale **30**. In FIG. **3**A, the indicator **36** may be selectively plugged into the scale **30**, via cable **40**, to obtain the force measurement. Alternatively, the indicator **36** may be in wireless communication with the scale **30**. In one example, the indicator **36** is mounted near a chair umpire or other appropriate official for monitoring during the course of a tennis match. The indicator may include standard buttons, such as power, reset, etc. Because the tension of the net is directly correlated to the height of the net, this will alert the chair umpire (or other official) that, for example, the center-strap **22** has loosened (thus the tension will be lower), allowing the umpire to adjust it at an appropriate time during the match.

[0027] While this disclosure extends to all types of indicators **36**, the indicator **36** of FIG. **3**A may have the advantage of only being used during measurement, and not being exposed and vulnerable to damage during play. The indicator **36** of FIG. **3**A further takes up less space, and is not readily visible, compared to that of FIG. **2**. Moreover, since there are often several courts in any tennis club or professional tennis tournament, the (potentially) more expensive digital readout of the indicator **36** of FIG. **3**A need not be purchased for each and every pull scale **14**, since the measuring of the force F_1 can be done on several courts using the same indicator **36**.

[0028] FIG. **3**B shows a variation in which a scale is built into a standard latching found in most tennis center-straps **22**. The result is a scale and latching combination that is not appreciably larger than any standard latching. In one example, a pull scale **44** is incorporated into the latching **42**. The pull scale **44** may include a spring acting on pin **46**, which is connected to the center-strap **22** via the second connecting support **34**. The pin **46** is moveable is responsive to the force F_1. The pin **46** is attached to an indicator **48** that moves relative to indicia **50**. In one example, the indicia **50** corresponds to a preferred net tension. Other indicia may be present.

[0029] FIG. **3**C shows three pull scales (e.g., **32**A-**32**C) which are not electronic. While perhaps not as accurate or as easy to read, they have the potential advantage of greater durability, lower cost, and avoid the issue of batteries. These first three scales can be incorporated into this disclosure, should one desire a non-electronic scale. The fourth scale **32**D is an example of an off the shelf pocket size digital pull scale.

[0030] As the upper cable **18** is adjusted, the force F_1 will change, and, in turn, so will the height H of the net **12** (between the net post **18** or the singles stick **43**, and the center-strap **22**) and the overall tension in the upper cable **18**. In one example, a loose net may indicate a force F_1 of 4.5 kg while a tight net might show a force F_1 of 5.8 kg (approximately 44 N and 57 N, respectively). The scale **30** can accurately measure the force F_1. In the example of FIGS. **1**-**3**B, the measurement is made at a point furthest away from the net posts **16** (e.g., at the center-strap), which may exhibit the least tension, and is also the part of the net **12** most in play. Thus, the force F_1 exerted on the center-strap **22** at this point may provide the most useful information about the overall tension of the net **12**.

[0031] The measurement can be made with or without singles sticks **43** (FIG. **4**), as long as all measurements obtained are consistently. This is, in part, because any change in the angle of a taut upper cable **18** necessarily increases the tension, thus the singles sticks **43** may change the force F_1 on the center-strap **22** (having created a more acute angle), and so measurements with/without the singles stick **43** will be markedly different. Because the placement of the singles sticks **43** must be exact, it may be preferred that the net tension is measured before the singles sticks **43** are placed, thus removing a possible variable. Further, when the upper cable **18** is cranked tighter, it moves slightly laterally and therefore may cause the singles sticks **43** to lose their exact vertical position.

[0032] Turning to another embodiment, FIG. **4** illustrates singles sticks **43** provided relative to the net **12**. Singles sticks **43** may be used to provide a consistent measurement of the tension of the net **12**. In this embodiment, a downward force F_2 from the upper cable **18** of net **12** is measured. It will be understood that the downward force F_2 exerted by the net **12** will vary depending on how far a particular point of measurement is from the net posts **16**. A singles stick **43** is, by one example rule, positioned 91.4 cm from the sideline of a singles court. The height H of the net **12** at this point, by example, is 107 cm. As such, because the height and position of the singles stick **43** is precisely defined by the rules of tennis, it can be used to provide a uniform measurement to easily duplicate net tension. The downward force F_2 that the upper cable **18** exerts on the singles sticks **43**, in a direction substantially perpendicular to the length L of the net **12**, will accurately reflect a tension of the net **12**, since the arrangement of the singles stick **43** will be the generally be consistent.

[0033] In one example, the singles stick **43** is connected to a scale **52** at its base. Seen in detail in FIG. **5**, this scale **52** can be built into the base of the singles stick **43** (as shown), built into the playing surface **14**, or be a separate structure. The scale **52** may function substantially as described relative to the scale **30** of FIGS. **1**-**3**B. For instance, the scale **52** may include an indicator **54** having a digital screen **56** for expressing the measured force F_2. This screen **56** can be incorporated into the scale **52** or be separate and attached via a cable when measurements are made.

[0034] While there are two singles sticks **43** commonly employed in tennis (one on each end of the net), only one stick is generally required to measure the net tension. Further, it will be appreciated that while a standard singles stick is placed 91.4 cm outside the singles sideline, one can also place the device at another point along the net.

[0035] Further, because the presence of the center-strap **22** changes the net tension, the measurements taken at the singles sticks **43** will be markedly different if a center-strap **22** is not used, or if used, not at its regulation 91.4 cm height. Thus, the presence or absence of the center-strap **22** should be noted when measuring the force F_2. Likewise, the presence or absence of the singles sticks **43** should be noted when measuring the force F_1 at the center-strap, as discussed relative to FIGS. **1**-**3**B. This will, again, lead to consistency in the net tension.

[0036] FIG. **6**A shows a non-digital scale for measuring the force F_2. In FIG. **6**A, a singles stick **43** has a first section **58** overlapping a second section **60**. The first section **58** is moveable relative to the second section **60**. A spring **62** is provided inside the first section **58**, and generally resists the force F_2exerted on the singles stick **43** by way of the upper cable **18**. Depending on the level of force F_2, the spring **62** will compress a corresponding amount. In turn, the first section **58** will move relative to a second section **62**. The first section **58** in this example includes a window **64** and an indicator **66** that slides relative to indicia **68** on the second section **62**. Like in the above examples, the indicia **68** may correspond to a preferred net tension.

[0037] Turning to FIG. **6**B, a U-shaped guide **70** may optionally be attached to the first section **58**. The U-shaped guide **70** supports the upper cable **18**, and may be adjustable relative to the first section **58** via threads **72**. The threads **72** also allow the height of the singles stick **43** to be adjusted to meet the required 107 cm, while also allowing the singles stick **43** to customize the net tension.

[0038] Using any of the above embodiments, one can then duplicate a tension time and again. With no measureable variables, that is, the distance between the net posts (12.8 m), the inelasticity of the steel net cable, the height of the single post (107 cm), and the position of the singles stick (91.4 cm outside the single sideline), and the 91.4 cm height of the net at the center-strap, are all fixed by rule, the net tension will substantially be the exact same in each instance. This measurement can be used each time when putting a net up or can be used to simply test periodically that the net tension has remained the same.

[0039] An additional benefit of the system **10** relates to the service let rule. A serve that clips the net **12** but still falls in the service box is called a "let" and is re-played. With the instant disclosure, any ball that comes into contact with the net **12** will change the force (e.g., F_1 or F_2) caused by tension of the net **12**. Such a contact and the resulting change in the force will be picked up by the scale. That is, the contact between the ball and the net changes the force F_1, F_2 from a normal level to a threshold level indicating that there has been contact between the net **12** and the ball.

[0040] The threshold force will be of an extremely short duration, and may create a unique "fingerprint" of a sharp spike (dip/peak). When the threshold force is met, an audible signal (beep) may be triggered, indicating a "let."

[0041] The fingerprint associated with the threshold force will be different than the effect that wind might have. Essentially, the effect of wind on the net tension is more of a constant push than the short-term impact associated with a ball strike. For example, even strong wind gusts have a duration in seconds, while a serve regularly is double or triple that speed, and has an impact duration in milliseconds. Measuring the change of force relative to time (e.g., how fast the force changed from one millisecond to the next one or more) will isolate the signature of a ball impact, allowing it to be identified separately from any wind effect (which will be filtered out). This unique ball strike signature can be used to set the sensitivity for what will be triggered by the threshold force, indicating a "let" ball.

[0042] For purposes of illustrating the point, in the embodiment of FIGS. **1**-**3**B, the force F_1 will be steeply lower during a ball strike (indicating contact as the ball presses the net downward, counteracting (lowering) the force F_1 of the upward pull against the center-strap), while for the singles stick **43**, the force F_2 shown after a ball strike will be higher (as the ball slightly presses down on the net). If the change is short enough and strong enough, the threshold force will be reached (indicating a ball strike), thus triggering a beep or signal on the chair umpire device (i.e., the indicator). One example signal includes a vibration in the handset used by the umpire. In this example, the armed button on the handset pressed by the umpire to activate the let detection function for the serve includes a haptic feedback device, such as an asymmetrical rotary device (e.g., an asymmetrical motor), configured to generate a vibration force when the threshold force is reached such that the umpire feels the vibration when a let occurs, just as he might hear a beep. This ensures that the let is noticed by the umpire even in a noisy stadium. Additionally or alternatively, the signal could include a light, such as an LED light turning, for example, from blue to red. The light and vibration may be used in combination with one another and/or in combination with the afore-mentioned beep, providing a redundant three senses signal (audio, haptic, visual) to ensure no let is missed by the umpire. The chair umpire will activate the device only during a serve by pressing a button, which is then released, deactivating it as the point is under way (assuming there is no let or a service fault). At this time, a ball during a "rally" that clips the net, but lands into play on the other side, are not "lets" and are not replayed (these are typically called a "net cord" and play continues since the let rule only relates to serves). Signals indicating a net cord during a rally are neither needed nor desirable since it has no effect on play continuing.

[0043] The let indication feature may also be useful in matches, such as club matches or recreational matches, which do not typically involve a chair umpire. FIG. **7** schematically illustrates an embodiment in which an indicator is provided by a light **80**. In this example, the light **80** has been incorporated into the scale **30**. In one example of use, the light **80** is normally not illuminated during play, and is configured to illuminate when the above-mentioned threshold force is reached. The light **80** may be an LED light configured to illuminate a color that is easily visible by the players, such as red. The red light may stay illuminated for a set period of time, such as 5 seconds, after the let occurs to allow the players to view the light. Thus, when the light is on immediately after a serve, the players know that a let has occurred. If the light, however, comes on during a rally (when play continues even if the ball clips the net cord), the players can ignore the light. Thus, positioning the light **80** on the scale **30**, or alternatively in another location, near the bottom of the center-strap **22**, for example, helps avoid distracting the players during play.

[0044] In another example of use, the light **80** is always illuminated during play in a first color, such as green, which indicates that the above-mentioned threshold force has not been reached. When the threshold force is reached, the color of the light **80** changes to a second color, such as red. If the second color appears immediately following a serve, the players know that a let occurred. If the second color appears during a rally, the players can simply ignore the light.

[0045] While only one side of the scale **30** is illustrated in FIG. **7**, it should be understood that there may be another light **80** on the opposite side of the scale **30** such that both players can see the light. Alternatively, the light **80** can be positioned on a side of the scale **30** such that it is visible from both sides of a tennis court. Further still, the light **80** could be positioned elsewhere, and need not be incorporated into the scale **30**. For example, the light could be positioned below the center-strap **22** or could be positioned off the court in a location easily viewed by both players, such as a net post. Again, since there is no chair umpire or other individual to constantly turn the indicator on and off before a serve, the let detection system of the light **80** may always be activated during play, not just during service. Thus, this disclosure provides the light **80** in a location such that it does not distract the players during a rally, particularly where there is a let cord, but also such that players can easily view the light **80** when desired, such as during service and after a possible let.

[0046] FIG. **8** illustrates another example embodiment that is useful in situations where there is no chair umpire. In FIG. **8**, the indicator is provided by a speaker **82** configured to make a relatively loud beep when the above-mentioned threshold force is reached. In this example, the speaker **82** is incorporated into the scale **30**, but, as with the light **80**, that need not be the case. The speaker **82** could be positioned in another location adjacent the tennis court. Both players will be able to hear the beep from the speaker **82**, indicating that a let has occurred. The embodiment of FIG. **8** can be used in combination with the embodiment of FIG. **7**. That is, a beep could be used in combination with illumination of a light (or a change in color of an already-illuminated light) to indicate that a let has occurred.

[0047] It will be appreciated that players could have the ability to activate the let detection function right before a serve, and where the device would automatically de-activate seconds later in order to avoid a possible let signal in a rally. Either or both of the players could activate the device, say, by pressing a button on their person or racket wirelessly connected to the base that activates it right before the serve. While this would require one of the players to remember to activate the device each time before a serve is made, it provides the option of activation of the device only at the time of the serve.

[0048] That said, the embodiments of FIGS. **7** and **8** are provided such that the signal, whether audio, visual, or otherwise, will not disturb players during a rally, but the signal could be such that if one player believes that a let occurred, that both players can use the disclosed device to confirm that a let did indeed occur. For example, an example visual signal could be a bright, flashing light, or alternatively could be a discrete light or beep that avoids distracting players but will still provide confirmation if a player calls a let. Thus, since most tennis is not played at the professional level, where chair umpires are always used, this disclosure provides amateur players with a way to enforce an important rule in tennis—the let rule.

[0049] Although the different examples have the specific components shown in the illustrations, embodiments of this claimed invention are not limited to those particular combinations. It is possible to use some of the components or features from one of the examples in combination with features or components from another one of the examples. Furthermore it is appreciated that distances or features in the drawings may be reduced or exaggerated for illustrative purposes and do not in any way so limit the embodiment shown.

[0050] For example, while the forces F_1 and F_2 are substantially perpendicular to the length L of the net **12**, in an alternate embodiment the scale **30** is arranged to measure the tension in the upper cable **18** directly, although this arrangement may lack sensitivity and responsiveness for the required measurements.

[0051] As another example, while specific distances such as 107 cm and 91.4 cm have been mentioned above, as currently required by all tennis governing bodies, it should be understood that this disclosure extends to systems including other distances which may include other sports which employs nets. For instance, if the regulations from the tennis governing bodies are followed, the difference between the height at the net posts **16** and the center-strap **22** will be 15.6 cm. However, in some instances the regulations are not followed, resulting in a height difference of about 15.6 cm. As used herein, the term "about" is not a boundaryless term, and should be interpreted in the way one skilled in the art would interpret the term. Similarly, measurements as described in the screen readout are given as examples only and will be different under use.

[0052] One of ordinary skill in this art would understand that the above-described embodiments are exemplary and non-limiting. That is, modifications of this disclosure would come within the scope of the claims. Accordingly, the following claims should be studied to determine their true scope and content.

What is claimed is:

1. A net tension system, comprising

a net spanning a playing area, wherein the net is supported by a pair of net posts on opposite sides of the playing area;

a connector between the net posts, the net connected to the playing area by way of the connector;

a scale measuring a force exerted by the net on the connector; and

an indicator expressing when a threshold force measured by the scale has been met or exceeded during a short duration using at least one of (1) a vibration force, (2) a light, and (3) a sound, the threshold force being indicative of an impact between a ball and the net.

2. The net tension system as recited in claim **1**, wherein the indicator includes a haptic feedback device, and wherein the vibration force is generated by the haptic feedback device.

3. The net tension system as recited in claim **2**, wherein the haptic feedback device is incorporated into a handset used by an umpire, official, or other person.

4. The net tension system as recited in claim **1**, wherein the indicator includes a light, and wherein the indicator illuminates the light when the threshold force has been met.

5. The net tension system as recited in claim **4**, wherein the indicator illuminates the light in a first color when the threshold force has not been met or exceeded, and wherein the indicator illuminates the light in a second color different than the first color when the threshold force has been met.

6. The net tension system as recited in claim **4**, wherein the light is incorporated into a base that employs the scale.

7. The net tension system as recited in claim **4**, wherein the net is a tennis net, and wherein the light is positioned on or adjacent a center-strap, a net post, or any on-court structure of the playing area.

8. The net tension system as recited in claim **4**, wherein the indicator includes a speaker configured to generate the sound when the threshold force has been met or exceeded.

9. The net tension system as recited in claim **1**, wherein the indicator includes a speaker configured to generate the sound when the threshold force has been met.

10. The net tension system as recited in claim **1**, wherein the threshold force is based on a fingerprint and the fingerprint is a unique sharp spike in an output of the scale during the short duration.

11. A net tension system, comprising

a net spanning a playing area, wherein the net is supported by a pair of net posts on opposite sides of the playing area;

a connector between the net posts, the net connected to the playing area by way of the connector;

a scale measuring a force exerted by the net on the connector; and

an indicator expressing when a threshold force measured by the scale has been met or exceeded during a short duration using at least one of an audible signal, a haptic signal, and a visual signal, the threshold force being indicative of an impact between a ball and the net.

12. The net tension system as recited in claim **11**, wherein the indicator includes a light, and wherein the signal includes illumination of the light when the threshold force has been met or exceeded.

13. The net tension system as recited in claim **11**, wherein the indicator includes a speaker configured to generate the audible signal when the threshold force has been met.

14. The net tension system as recited in claim **11**, wherein the threshold force is based on a fingerprint and the fingerprint is a unique sharp spike in an output of the scale during the short duration.

15. A method, comprising:

measuring a force exerted by a net on a connector, the net connected to a playing area by way of the connector, the connector provided between a pair of net posts supporting the net on opposite sides of the playing area; and

indicating, using an indicator, whether a threshold force has been met or exceeded during a short duration using at least one of (1) a vibration force, (2) a light, and (3) a sound, the threshold force being indicative of an impact between a ball and the net.

16. The method as recited in claim **15**, wherein the indicator includes a haptic feedback device, and wherein the indicating step includes generating the vibration force with the haptic feedback device.

17. The method as recited in claim **15**, wherein the indicator includes a light, and wherein the indicating step includes illuminating the light after the threshold force has been met or exceeded.

18. The method as recited in claim **17**, wherein indicating step includes illuminating the light in a first color when the threshold force has not been met or exceeded and illuminating the light in a second color different than the first color when the threshold force has been met.

19. The method as recited in claim **15**, wherein the indicator includes a speaker, and wherein the indicating step includes generating the sound when the threshold force has been met.

20. The method as recited in claim **15**, wherein the threshold force is based on a fingerprint, and the fingerprint is a unique sharp spike in an output of a scale during the short duration.

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