tact area having a diameter D**2**, wherein deformed diameter D**2** (and the deformed contact area) is greater than the relaxed diameter D**1** (and the relaxed contact area). The application program or operating system of the mobile phone receives this information and uses the contact area as an indicator of an amount of acceleration being applied in the vertical direction.

FIGS. **8**A-C are partial cross-sectional views of a second mechanism **58** for measuring force in a "Y" direction with a deformable ball **72** in slightly deformed contact with a different region **44** of the touch screen **12** under the force of a spring **74** (FIG. **8**A), greatly deformed contact caused by movement of the module **50** to the right (FIG. **8**B), and in relaxed contact caused by movement of the module **50** to the left (FIG. **8**C), respectively. The second mechanism **58** includes a right-angled or L-shaped lever having a first leg **76** that extends substantially perpendicular to the plane of the touch screen to support a mass **78** and a second leg **80** that extends substantially parallel to the plane of the touch screen. The L-shaped lever pivots about an axis that is parallel to the plane of the touch screen and aligned with the X-axis (in and out of the page). Accordingly, movement of the accelerometer module **50** in the X-direction or the Z-direction will not induce any deformation of the ball **72**.

In FIG. **8**A, the ball is slightly deformed by the force of the spring **74** to produce a contact area D**3**. In FIG. **8**B, the module **50** is moved to the right resulting in further deformation of the ball **72** and producing a larger contact area D**4**. In FIG. **8**C, the module **50** is moved to the left resulting in less formation of the ball **72** and producing a smaller contact area D**5**. The application program or operating system of the mobile phone receives this information and uses the contact area as an indicator of an amount of acceleration being applied in the Y-direction. Unlike the mechanism **56** of FIGS. **7**A-B which could only detect one direction of movement along an axis (i.e., upward movement in the +Z direction), the mechanism **58** of FIGS. **8**A-C provides sufficient information to sense movement two directions along an axis. Movement to the right (i.e., in the +Y direction) causes a contact area that is greater than the contact area when the accelerometer is stationary. Movement to the left (i.e., in the −Y direction) causes a contact area that is less than the contact area when the accelerometer is stationary. The degree of movement or acceleration may be determined as well as the direction, because the degree of increase or decrease in the contact area in sensed by the touch screen and provided to the processor. It should be recognized that the first mechanism **56** may also be implemented to detect movement in two directions by increasing the force of the spring **70**.

It should also be recognized that a third mechanism **54** (as shown in FIG. **6**) may be provided in the same manner as the second mechanism **58**, except that it is secured to the module at a right angle to the second mechanism **58**. Specifically, the third mechanism **54** has a pivot axis that is parallel with the Y-axis such that it only senses movement in the X-direction. Furthermore, the third mechanism **54** makes contact with the touch screen **12** in a different predetermined region **42** so that the processor can determine whether the force is attributable to the X, Y or Z axis.

FIGS. **9**A-D are side views of deformable members that would provide different relationships between force and contact area, regardless of the type of mechanism or axial component of force being sensed. In FIG. **9**A, a triangular or pyramidal member **82** is mounted to a lever **83** and presents a point or vertex onto the touch screen **12**. The vertex would be expected to initially produce a very small contact area and require less force to deform than a sphere. In FIG. **9**B, a spherical section **84** is coupled to a lever **85** and presents a spherical surface against the touch screen **12**. The spherical section **84** should produce a similar relationship between force and contact area as a complete sphere, but will require less space because it is thinner and will require less angular displacement of the lever. In FIG. **9**C, an irregularly shaped member **86** is coupled to a lever **87** and illustrates that, for any given material, a profile may be modified to produce a desired relationship between force and contact area. In FIG. **9**D, a hollow member **88** is coupled to a lever **89**, where making the member hollow may result in a greater contact area during deformation since there is no internal material to compress or stretch. Such a hollow member may be perforated or air tight.

FIG. **10** is a partial perspective view of the first mechanism **56** with a coil spring **70** that biases the lever **66** toward the touch screen **12** to prevent loose swinging of the lever and maintain contact between the deformable member **60** and the touch screen **12**. As previously discussed, embodiments of the spring **70** may partially deform the member **60** to enable detection of both upward movement via increases in contact area and downward movements via decreases in contact area. The coil spring **70** will typically have one or more turns or coils and two legs that project outward to engage the lever **66** and the support bracket **62**, such as against a tab **63**.

FIGS. **11**A-B are partial cross-sectional views showing potential attachment of a deformable member to a lever. In FIG. **11**A, a deformable member **90** takes the shape of a hollow sphere and is coupled to the lever **92** by a rivet or other fastener **94**. In FIG. **11**B, a spherical section **96** includes tabs **98** for coupling to the lever with rivets or other fasteners **94**. It should also be recognized that the deformable members may be secured using adhesives or other attachment means.

FIGS. **12**A-C are partial cross-sectional views of embodiments using a tubular or cylindrical chamber to hold the deformable member, mass, and spring in a manner so that acceleration in a particular direction causes deformation against the touch sensitive device. In FIG. **12**A, the module **50** includes a mechanism **140** forming a tubular chamber defined by walls **142**. The chamber walls **142** secure the deformable member **60**, the mass **68**, and a spring **144** in alignment. Accordingly, acceleration of the module in the +Z direction (upward on the page) will cause deformation of the member **60** against the touch screen **12**, as shown in FIG. **12**B. As in other embodiments, the spring may simply secure the mass **68** against the deformable member **60** such that deformation indicates acceleration in the +Z direction, or the spring may normally cause a first degree of deformation in order to indicate acceleration in the +Z direction by an increase in deformation and indicate acceleration in the −Z direction by a decrease in deformation.

FIG. **12**C is a partial cross-sectional view of an embodiment for detecting acceleration in the +Y or −Y direction (as shown) or even in the +X or −X direction by orienting the mechanism at 90 degrees. Whereas the mechanisms of FIGS. **8**A-C use a pivot to convert a force parallel to the touch sensitive device to a force perpendicular to the touch sensitive device, this mechanism **150** uses a fluid in the tubular chamber to enable the direction of the force to be changed as desired. Accordingly, acceleration of the module **50** in the +Y direction (to the right of the page) causes a high mass hydraulic piston **152** to move to the left, pushing the fluid **154** against the low mass piston **156**, which in turn deforms the member **60** against the touch screen **12**. The hydraulic tube is bent 90 degrees so that movement of the higher mass piston **152** in a direction parallel to the plane of the touch sensitive device **12** is converted to movement of the low mass piston **156** perpendicular to the touch sensitive device **12**. Optionally, the low mass piston could be replaced with a membrane or bellows to